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Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

Each major division is further divided into as many as nine specific categories, which are identified by category numbers.

Abstracts in *STAR* are grouped by specific category, the categories appearing in sequential order. Category breaks in the abstract section are identified by the category number and title, and a scope note. Cross-references to other categories are provided as appropriate. For example:

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For related information see also *34 Fluid Mechanics and Heat Transfer*.

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SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) **2505**

89 ASTRONOMY **2505**
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS **2506**
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION **N.A.**
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS **2506**
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION **2507**
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

GENERAL

99 GENERAL **2507**

Note: N.A. means that no abstracts were assigned to this category for this issue.

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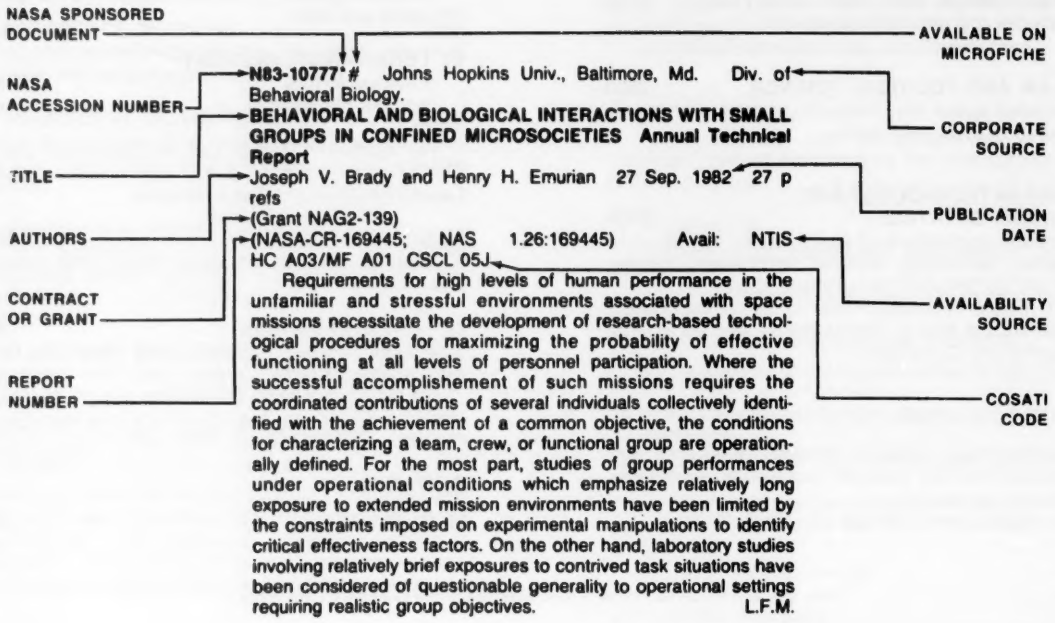
TYPICAL CITATION AND ABSTRACT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N83-10777* # Johns Hopkins Univ., Baltimore, Md. Div. of Behavioral Biology.
CORPORATE SOURCE
TITLE
BEHAVIORAL AND BIOLOGICAL INTERACTIONS WITH SMALL GROUPS IN CONFINED MICROSOCIETIES Annual Technical Report
PUBLICATION DATE
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Joseph V. Brady and Henry H. Emurian 27 Sep. 1982 27 p refs
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(NASA-CR-169445; NAS 1.26:169445) Avail: NTIS
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COSATI CODE
Requirements for high levels of human performance in the unfamiliar and stressful environments associated with space missions necessitate the development of research-based technological procedures for maximizing the probability of effective functioning at all levels of personnel participation. Where the successful accomplishement of such missions requires the coordinated contributions of several individuals collectively identified with the achievement of a common objective, the conditions for characterizing a team, crew, or functional group are operationally defined. For the most part, studies of group performances under operational conditions which emphasize relatively long exposure to extended mission environments have been limited by the constraints imposed on experimental manipulations to identify critical effectiveness factors. On the other hand, laboratory studies involving relatively brief exposures to contrived task situations have been considered of questionable generality to operational settings requiring realistic group objectives. L.F.M.

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01 AERONAUTICS (GENERAL)

N83-25651* National Aeronautics and Space Administration, Washington, D. C.
AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 161)
May 1983 105 p
(NASA-SP-7037(161); NAS 1.21:7037(161)) Avail: NTIS HC A06 CSCL 01A

This bibliography lists 375 reports, articles and other documents introduced into the NASA scientific and technical information system in April 1983. Author

N83-25652# Federal Aviation Administration, Washington, D.C. Office of Aviation Policy and Plans.
FAA AVIATION FORECASTS: FISCAL YEARS 1983-1994
Feb. 1983 80 p
(AD-A124611; FAA-APO-83-1) Avail: NTIS HC A05/MF A01 CSCL 01/2

This report contains the Fiscal Years 1983-1994 Federal Aviation Administration (FAA) forecasts of aviation activity at FAA facilities. These include airports with FAA control towers, air route traffic control centers, and flight service stations. Detailed forecasts were made for the four major users of the national aviation system: air carriers, air taxi/commuters, general aviation and the military. The forecasts have been prepared to meet the budget and planning needs of the constituent units of the FAA and to provide information that can be used by state and local authorities, by the aviation industry and the general public. The overall outlook for the forecast period is for moderate economic growth, relatively stable real fuel prices, and decreasing inflation. Based upon these assumptions, aviation activity is forecast to increase by Fiscal Year 1994 by 97 percent at towered airports, 50 percent at air route traffic control centers, and 54 percent in flight services performed. Hours flown by general aviation is forecast to increase 56 percent and helicopter hours flown 80 percent. Scheduled domestic revenue passenger miles (RPM's) are forecast to increase 81 percent, with scheduled international RPM's forecast to increase by 80 percent and commuter RPM's forecast to increase by 220 percent. GRA

N83-25653# Federal Aviation Administration, Washington, D.C. Office of Management Systems.
GENERAL AVIATION ACTIVITY AND AVIONICS SURVEY Annual Report, 1981
Judith C. Schwenk (Transportation Systems Center) and Patricia W. Carter Dec. 1982 110 p refs
(AD-A124595; FAA-MS-82-5) Avail: NTIS HC A06/MF A01 CSCL 01/2

This report presents the results and a description of the 1981 General Aviation Activity and Avionics Survey. The survey was conducted during 1982 by the FAA to obtain information on the activity and avionics of the United States registered general aviation aircraft fleet, the dominant component of civil aviation in the U.S The survey was based on a statistically selected sample of abou 8.9 percent of the general aviation fleet and obtained a response rate of 61 percent. Survey results are based upon response bu are expanded upward to represent the total population. Survey results revealed that during 1981 an estimated 40.7 million hours of flying time were logged by the 213,226 active general aviation aircraft in the U.S. fleet, yielding a mean annual flight time per aircraft of 188.1 hours. The active aircraft represented about 83 percent of the registered general aviation fleet. The report contains breakdowns of these and other statistics by manufacturer/model group, aircraft type, state and region of based aircraft, and primary use. Also included are fuel consumption, lifetime airframe hours, avionics, and engine hours estimates. In addition, tables are included for detailed analysis of the avionics capabilities of GA fleet. GRA

N83-25654# Federal Aviation Administration, Washington, D.C. Office of Aviation Policy and Plans.
AVIATION EXECUTIVE CONFERENCE Summary Report
1981 48 p Conf. held in Washington, D.C., 30 June 1981
(AD-A124581; FAA-APO-81-9) Avail: NTIS HC A03/MF A01 CSCL 01/2

Partial Contents: Deregulation-How Far Should the FAA Go?; What Should be the FAA's Role in Encouraging and Fostering the Development of aviation and Helping U.S. Airframe Manufacturers be More Competitive with Foreign Manufacturers?; What User/Information Services Should Continue After CAB Abolishment?; Major Hub Airports Sharing Revenues with Reliever Airports; Air Traffic Control System of the Future: Labor Intensive Versus Capital Intensive; and Airport/Aircraft Noise Policy. GRA

N83-25655# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
THE EFFECTS OF THE PRODUCTION ORIENTED MAINTENANCE ORGANIZATION (POMO) CONCEPT ON ADTAC AIRCRAFT MAINTENANCE PRODUCTIVITY AND QUALITY M.S. Thesis
James B. Amend and Larry E. Eriksen Sep. 1982 139 p refs
(AD-A123981; AFIT-LSSR-70-82) Avail: NTIS HC A07/MF A01 CSCL 01/3

Virtually all USAF tactical fighter and interceptor units work under the AFR 66-5 decentralized POMO concept for aircraft maintenance. This thesis used an aggregation of maintenance data from five ADTAC Fighter Interceptor Squadrons spanning periods preceding and following POMO implementation. Hypotheses reflecting POMO's intended effects on maintenance productivity and quality were then statistically tested using the Analysis of Variance, Duncan'S Multiple Range Test, and the Large Sample Test of Significance. The final research results showed that conversion to POMO generally improved aircraft maintenance performance in the ADTAC FISs, but not to any great extent. These findings may possibly be generalizable to other USAF tactical air force operations. Author (GRA)

N83-25656# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
AIRFRAME RDT&E COST ESTIMATING: A JUSTIFICATION FOR AND DEVELOPMENT OF UNIQUE COST ESTIMATING RELATIONSHIPS ACCORDING TO AIRCRAFT TYPE M.S. Thesis
Charles L. Beck, Jr. and Dennis L. Pfeil Sep. 1982 205 p refs (AD-A123848; AFIT-LSSR-56-82) Avail: NTIS HC A10/MF A01 CSCL 01/3

Airframe RDT&E costs are invariably predicted by utilizing one general cost estimating relationship (CER) regardless of aircraft type(fighter, attack, or bomber/cargo). This practice results in inconsistent and often very significant inaccuracies in predicting weapon system development costs which may affect subsequent program funding. This thesis examines the utility of a unique CER for each aircraft type to be used for estimating airframe development costs. The methodology consisted of factor analysis and step-wise multiple regression analysis. Based on the results, the authors concluded that the unique CERs are consistently and significantly more accurate when estimating airframe RDT&E costs than the general CERs developed by former studies. The results of this study should be applicable to those organizations dealing with the procurement of aircraft airframes. Author (GRA)

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N83-25657*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EXPERIMENTAL RESULTS OF A DEFLECTED THRUST V/STOL NOZZLE RESEARCH PROGRAM
Paul L. Burstadt and Albert L. Johns Mar. 1983 26 p refs Presented at the 21st Aerospace Sci. Conf., Reno, Nev., 10-13 Jan. 1983; sponsored by AIAA Original contains color illustrations
(NASA-TM-83069; E-1539; NAS 1.15:83069) Avail: NTIS HC A03/MF A01 CSCL 01A

Four deflected thrust nozzle concepts, designed to operate at the low pressure ratio typical of high bypass-ratio turbofan engines for medium speed (subsonic) V/STOL aircraft, were studied. Maps of overall performance characteristics and exit velocity distributions are used to highlight similarities and differences between the four concepts. Analytically determined secondary flows at the exit of a 90 deg circular pipe bend are compared with the experimental results from the more complex three dimensional geometries. The relative impact of total-pressure losses and secondary flows on nozzle thrust coefficient is addressed by numerical integration of exit velocity measurements. Author

N83-25658*# Georgia Inst. of Tech., Atlanta. School of Aerospace Engineering.
HELICOPTER ROTOR LOADS USING DISCRETIZED MATCHED ASYMPTOTIC EXPANSIONS Final Report
G. Alvin Pierce and Anand R. Vaidyanathan May 1983 76 p refs
(Contract NAS1-16817)
(NASA-CR-166092; NAS 1.26:166092) Avail: NTIS HC A05/MF A01 CSCL 01A

The numerical practicality of a matched asymptotic expansion approach for the computation of unsteady three dimensional airloads on a helicopter rotor was improved. This effort utilizes a discretized repesentation of the doublet strength distribution and helical streamlines to decrease the computational requirements of the original analysis. The continuous variation of the doublet strength was approximated by piecewise constant or piecewise quadratic distributions, and the helical trajectory of a fluid particle was approximated by connected straight line segments. As a direct result of these simplified representations the computational time required for the execution of a typical flight condition was reduced by an order of magnitude with respect to the requirements of the original analysis. Airloads which were computed using the discretized method for a two bladed model rotor and a full scale four bladed rotor are in close agreement with measured results and airloads from the original asymptotic analysis. For conditions characterized by significant rotor/wake interaction the piecewise constant representation requires a reduced azimuth spacing to maintain acceptable accuracy. S.L.

N83-25659*# Georgia Inst. of Tech., Atlanta. School of Aerospace Engineering.
HELICOPTER ROTOR LOADS USING MATCHED ASYMPTOTIC EXPANSIONS: USER'S MANUAL Final Report
G. Alvin Pierce and Anand R. Vaidyanathan May 1983 92 p
(Contract NAS1-16817)
(NASA-CR-166093; NAS 1.26:166093) Avail: NTIS HC A05/MF A01 CSCL 01A

Computer programs were developed to implement the computational scheme arising from Van Holten's asymptotic method for calculating airloads on a helicopter rotor blade in forward flight, and a similar technique which is based on a discretized version of the method. The basic outlines of the two programs are presented, followed by separate descriptions of the input requirements and output format. Two examples illustrating job entry with appropriate input data and corresponding output are included. Appendices contain a sample table of lift coefficient data for the NACA 0012 air foil and listings of the two programs. S.L.

N83-25660*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
HIGH REYNOLDS NUMBER TESTS OF THE CAST 10-2/DOA 2 AIRFOIL IN THE LANGLEY 0.3-METER TRANSONIC CRYOGENIC TUNNEL, PHASE 1
David A. Dress (Kentron International, Inc.), Peggy D. McGuire, Egon Stanewsky (DFVLR, West Germany), and Edward J. Ray May 1983 347 p refs
(NASA-TM-84620; NAS 1.15:84620) Avail: NTIS HC A15/MF A01 CSCL 01A

A wind tunnel investigation of an advanced technology airfoil, the CAST 10-2/DOA 2, was conducted in the Langley 0.3 meter Transonic Cryogenic Tunnel (0.3 m TCT). This was the first of a series of tests conducted in a cooperative National Aeronautics and Space Administration (NASA) and the Deutsche Forschungs- und Versuchsanstalt fur Luft- und Raumfahrt e. V. (DFVLR) airfoil research program. Test temperature was varied from 280 K to 100 K to pressures from slightly above 1 to 5.8 atmospheres. Mach number was varied from 0.60 to 0.80, and the Reynolds number (based on airfoil chord) was varied from 4 x 10 to the 8th power to 45 x 10 to the 6th power. This report presents the experimental aerodynamic data obtained for the airfoil and includes descriptions of the airfoil model, the 0.3 m TCT, the test instrumentation, and the testing procedures. Author

N83-25661*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INTERFERENCE EFFECTS OF AFT REACTION-CONTROL YAW JETS ON THE AERODYNAMIC CHARACTERISTICS OF A SPACE SHUTTLE ORBITER MODEL AT SUPERSONIC SPEEDS
Peter F. Covell Jun. 1983 47 p refs
(NASA-TM-84645; L-15576; NAS 1.15:84645) Avail: NTIS HC A03/MF A01 CSCL 01A

A wind tunnel investigation of the interference effects of aft reaction control system yaw jet plumes on a 0.0125 scale Space Shuttle orbiter model was conducted at Mach numbers from 2.50 to 4.50. Test variables included model angle of attack, model angle of sideslip, jet to free stream mass flow ratio, and number and position of operating jets. The aft reaction control jet plume creates a blockage above and behind the wing on the side in which the jet exhausts and results in flow separation on the wing upper surface and fuselage side. Positive pitching moment and side force increments and negative yawing moment and rolling moment increments due to the flow separations are incurred for

left side firing jets, primarily at angles of attack above 10 deg. The yawing moment interference increments are favorable and result in a small jet thrust amplification. As a result of this investigation, the aft reaction control system was certified for operation at supersonic Mach numbers prior to the first flight of the space transportation system (STS-1). Author

N83-25662*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NASA LOW-SPEED CENTRIFUGAL COMPRESSOR FOR FUNDAMENTAL RESEARCH
Jerry R. Wood, Paul W. Adam, and Alvin E. Buggele 1983 13 p refs Presented at the 19th Joint Propulsion Conf. and Tech. Display, Seattle, 27-29 Jun. 1983; sponsored by AIAA, SAE and ASME
(NASA-TM-83398; E-1675; NAS 1.15:83398) Avail: NTIS HC A02/MF A01 CSCL 01A

A centrifugal compressor facility being built by the NASA Lewis Research Center is described; its purpose is to obtain benchmark experimental data for internal flow code verification and modeling. The facility will be heavily instrumented with standard pressure and temperature probes and have provisions for flow visualization and laser Doppler velocimetry. The facility will accommodate rotational speeds to 2400 rpm and will be rated at pressures to 1.25 atm. The initial compressor stage for testing is geometrically and dynamically representative of modern high-performance stages with the exception of Mach number levels. Design exit tip speed for the initial stage is 500 ft/sec with a pressure ratio of 1.17. The rotor exit backsweep is 55 deg from radial. M.G.

N83-25663*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ROTOR BLADE WITH PASSIVE TUNED TAB Patent Application
Thomas G. Campbell, inventor (to NASA) (Sikorsky Aircraft, Stratford, Conn.) Filed 28 Apr. 1983 21 p Sponsored by NASA
(NASA-Case-ARC-11444-1; US-Patent-Appl-SN-489675) Avail: NTIS HC A02/MF A01 CSCL 01A

A structure for reducing vibratory airloading in a rotor blade with a leading edge and a trailing edge includes a cut-out portion at the trailing edge. A substantially wedge shaped cross-section, inertially deflectable tab, also having a leading edge and a trailing edge is pivotally mounted in the cut-out portion. The trailing edge of the tab may move above and below the rotor blade. A torsion strap applies force against the tab when the trailing edge of the tab is above and below the rotor blade. A restraining member is slidably movable along the torsion strap to vary torsional biasing force supplied by the torsion bar to the tab. A plurality of movable weights positioned between plates and vary a center of gravity of the tab. Skin of the tab is formed from unidirectional graphite and fiberglass layers. Sliders, coupled with a pinned degree of freedom at rod eliminate bending of tab under edgewise blade deflection. Author

N83-25664*# Georgia Inst. of Tech., Atlanta.
MEAN VELOCITIES AND REYNOLDS STRESSES UPSTREAM OF A SIMULATED WING-FUSELAGE JUNCTURE Final Report
H. McMahon, J. Hubbartt, and L. R. Kubendran Washington NASA Jun. 1983 170 p refs
(Contract NAG1-40)
(NASA-CR-3695; NAS 1.26:3695) Avail: NTIS HC A08/MF A01 CSCL 01A

Values of three mean velocity components and six turbulence stresses measured in a turbulent shear layer upstream of a simulated wing-fuselage juncture and immediately downstream of the start of the juncture are presented nd discussed. Two single-sensor hot-wire probes were used in the measurements. The separated region just upstream of the wing contains an area of reversed flow near the fuselage surface where the turbulence level is high. Outside of this area the flow skews as it passes around the body, and in this skewed region the magnitude and distribution of the turbulent normal and shear stresses within the shear layer are modified slightly by the skewing and deceleration of the flow. A short distance downstream of the wing leading edge the secondary flow vortext is tightly rolled up and redistributes both mean flow and turbulence in the juncture. The data acquisition technique employed here allows a hot wire to be used in a reversed flow region to indicate flow direction. Author

N83-25665*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PRESSURES MEASURED IN FLIGHT ON THE AFT FUSELAGE AND EXTERNAL NOZZLE OF A TWIN-JET FIGHTER
Jack Nugent, Thomas J. Plant, Robert A. Davis, and Norman V. Taillon May 1983 90 p refs
(NASA-TP-2017; H-1161; NAS 1.60:2017) Avail: NTIS HC A05/MF A01 CSCL 01A

Fuselage, boundary layer, and nozzle pressures were measured in flight for a twin jet fighter over a Mach number range from 0.60 to 2.00 at test altitudes of 6100, 10,700, and 13,700 meters for angles of attack ranging from 0 deg to 7 deg. Test data were analyzed to find the effects of the propulsion system geometry. The flight variables, and flow interference. The aft fuselage flow field was complex and showed the influence of the vertical tail, nacelle contour, and the wing. Changes in the boattail angle of either engine affected upper fuselage and lower fuselage pressure coefficients upstream of the nozzle. Boundary layer profiles at the forward and aft locations on the upper nacelles were relatively insensitive to Mach number and altitude. Boundary layer thickness decreased at both stations as angle of attack increased above 4 deg. Nozzle pressure coefficient was influened by the vertical tail, horizontal tail boom, and nozzle interfairing; the last two tended to separate flow over the top of the nozzle from flow over the bottom of the nozzle. The left nozzle axial force coefficient was most affected by Mach number and left nozzle boattail angle. At Mach 0.90, the nozzle axial force coefficient was 0.0013. Author

N83-25666*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECT OF EMPENNAGE LOCATION ON TWIN-ENGINE AFTERBODY-NOZZLE AERODYNAMIC CHARACTERISTICS AT MACH NUMBERS FROM 0.6 TO 1.2
Laurence D. Leavitt May 1983 223 p refs
(NASA-TP-2116; L-15527; NAS 1.60:2116) Avail: NTIS HC A10/MF A01 CSCL 01A

The Langley 16-foot transonic tunnel was used to determine the effects of several empennage and afterbody parameters on the aft-end aerodynamic characteristics of a twin-engine fighter-type configuration. Model variables were as follows: horizontal tail axial location and incidence, vertical tail axial location and configuration (twin- versus single-tail arrangements), tail booms, and nozzle power setting. Tests were conducted over a Mach number range from 0.6 to 1.2 and over an angle-of-attack from -2 deg to 10 deg. Jet total-pressure ratio was varied from jet off to approximately 10.0. Author

N83-25667*# Kansas Univ. Center for Research, Inc., Lawrence. Flight Research Lab.
ANALYSIS OF NONPLANAR WING-TIP-MOUNTED LIFTING SURFACES ON LOW-SPEED AIRPLANES Final Report
C. P. vanDam and Jan Roskam Washington NASA Jun. 1983 175 p refs
(Contract NsG-1633)
(NASA-CR-3684; NAS 1.26:3684; KU-FRL-427-1) Avail: NTIS HC A08/MF A01 CSCL 01A

Nonplanar wing tip mounted lifting surfaces reduce lift induced drag substantially. Winglets, which are small, nearly vertical, winglike surfaces, are an example of these devices. To achieve reduction in lift induced drag, winglets produce significant side forces. Consequently, these surfaces can seriously affect airplane lateral directional aerodynamic characteristics. Therefore, the effects of nonplanar wing tip mounted surfaces on the lateral directional stability and control of low speed general aviation airplanes were studied. The study consists of a theoretical and an experimental, in flight investigation. The experimental investigation involves flight tests of winglets on an agricultural airplane. Results

of these tests demonstrate the significant influence of winglets on airplane lateral directional aerodynamic characteristics. It is shown that good correlations exist between experimental data and theoretically predicted results. In addition, a lifting surface method was used to perform a parametric study of the effects of various winglet parameters on lateral directional stability derivatives of general aviation type wings. S.L.

N83-25668# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
WIND TUNNEL INVESTIGATION OF VARYING HINGED FLAPS M.S. Thesis
Howard J. Price, Jr. Dec. 1982 110 p refs
(AD-A124703; AFIT/GAE/AA/82D-23) Avail: NTIS HC A06/MF A01 CSCL 14/2

The objective of this thesis was to compare thin-airfoil theoretical predictions of the change in zero-lift angle of attack divided by flap deflection versus flap-hinge location and the change in moment coefficient about the aerodynamic center. GRA

N83-25669# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
TRANSIENT HEAT-TRANSFER MEASUREMENT TECHNIQUE IN WIND TUNNEL AND DATA ANALYSIS TECHNIQUE USING SYSTEM IDENTIFICATION THEORY M.S. Thesis
Yuk K. Woo Dec. 1982 93 p refs
(AD-A124663; AFIT/GAE/AA/82D-34) Avail: NTIS HC A05/MF A01 CSCL 14/2

A transient maneuver testing technique has been developed by the Air Force Flight Test Center (AFFTC) for aerothermodynamic evaluation of the Space Shuttle Orbiter Thermal Protection System (TPS) during reentry. The objectives are to determine the feasibility of the testing technique and the feasibility of using the transient maneuver technique for wind tunnel heat transfer measurements. The transient maneuver technique can enhance the capability of wind tunnel testing by reducing the overall required testing time, and in turn lower the cost of testing significantly. Wind tunnel data were obtained using the TPS materials of the Orbiter as wind tunnel test articles. The principle finding indicates the heating estimates are significantly lower for the TPS test articles than the thin skin test article and Eckert theory. The discrepancy is believed to be caused mainly by the non-isothermal wall effect. Finally, the transient maneuver testing technique has been proven since the transient maneuvers agree well with the steady state results. GRA

N83-25670# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THEORETICAL DETERMINATION OF THE LIFT OF A SIMULATED EJECTOR WING M.S. Thesis
John T. Domalski Dec. 1982 74 p refs
(AD-A124695; AFIT/GAE/82D-10) Avail: NTIS HC A04/MF A01 CSCL 12/1

The solution procedure and supporting theory have been developed for calculation of the lift per unit span of an ejector wing model. Model consists of two vortex sheets. A point sink and a point source in a uniform stream. The solution is shown to be dependent on the number of control points used and examples using five control points are presented. A FORTRAN computer program for the Five-Control-Point case is presented.
Author (GRA)

N83-25671# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
WIND TUNNEL TEST OF A C-18 AIRCRAFT MODIFIED WITH THE ADVANCED RANGE INSTRUMENTATION AIRCRAFT RADOME M.S. Thesis
David M. Sprinkel Dec. 1982 185 p refs
(AD-A124771; AFIT/GAE/AA/82D-28) Avail: NTIS HC A09/MF A01 CSCL 20/4

The Air Force intends to modify Boeing 707-320C aircraft (Air Force designation, C-18) with the large blunt nosed Advanced Range Instrumentation Aircraft (ARIA) radome formerly installed on EC-135 aircraft. This modification will significantly increase fuselage area forward of the aircraft center of gravity and is expected to reduce longitudinal and directional stability, and increase drag. These anticipated aerodynamic changes were evaluated from data gathered on a modified (ARIA) gathered on a modified (ARIA) and unmodified (BASIC) 1/100 scale model C-18 tested in the AFIT five foot low speed wind tunnel. GRA

N83-25672# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
NUMERICAL SOLUTIONS FOR CRITICAL AND UNSTEADY SUBCRITICAL FLOW ABOUT AN EXTERNAL COMPRESSION AXI-SYMMETRIC INLET Ph.D. Thesis
Richard W. Newsome, Jr. Nov. 1982 188 p refs
(AF Proj. 2307)
(AD-A124743; AFIT/DS/AA/82-2) Avail: NTIS HC A09/MF A01 CSCL 12/1

The unsteady, compressible, Reynolds-averaged Navier-Stokes equations were solved for the flow field about an external compression axi-symmetric inlet with a length to diameter ratio, L/D = 15.88, at Mach 2.0 and a Reynolds number based on diameter, ReD = 2.36 times 10 to the 6th power, operating in the near-critical and subcritical flow regimes. The near-critical solution reached a stable steady state while the subcritical solutions attained an unstable bounded oscillatory state, characterized by large amplitude pressure oscillations and traveling shock waves. This phenomenon is a result of a shear layer instability combined with a closed-loop feedback of reflected disturbances and the naturally occurring self-sustained oscillations are commonly known as buzz. Numerical results are given in terms of Mach contours, velocity field plots, pressure-time traces at selected stations, as well as mass flux and other mass-averaged quantities along the duct length. Comparison with experiment is also given.
Author (GRA)

N83-25673# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A WIND TUNNEL STUDY OF THE EFFECTS OF A CLOSE-COUPLED CANARD ON THE AERODYNAMIC CHARACTERISTICS OF A FORWARD-SWEPT WING IN INCOMPRESSIBLE FLOW M.S. Thesis
Paul M. Weaver Dec. 1982 237 p refs
(AD-A124722; AFIT/GAE/AA/82D-30) Avail: NTIS HC A11/MF A01 CSCL 01/3

Low speed wind tunnel tests and a boundary layer flow visualization study were conducted in the Air Force Institute of Technology fourteen inch wind tunnel to determine the differences in the aerodynamic characteristics among a forward-swept wing and several forward-swept wing/canard configurations. Both the wing and canard were constructed with an NACA 0006 airfoil section and had quarter chord sweeps of -30 and +40 deg, respectively. All tests were conducted at a dynamic pressure of 25.6 lbf/sq.ft and a Reynolds number of 1.9 x 100,000 based on the wing mean aerodynamic chord. The results show that the changes in the aerodynamic characteristics are dependent upon canard location relative to the wing, canard incidence, and model angle of attack. The largest increases in CL were observed for the two canard positions above and closest to the wing. A decrease in CM was noted as the canard location changed vertically from the upper to the lower test positions. An increase in CD occurred as the canard location approached the wing horizontally. Comparison of the force and moment data with the flow study photographs suggests that the canard wake/vortex system is responsible for the changes in the wing/canard aerodynamic characteristics. GRA

N83-25674# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
APPLICATION OF A FINITE DIFFERENCE METHOD TO THE TRANSONIC AIRFOIL PROBLEM M.S. Thesis
Michael Patrick Burke Dec. 1982 52 p refs
(AD-A124720; AFIT/GAE/AA/79D-4) Avail: NTIS HC A04/MF A01 CSCL 20/4

This study presents the development and evaluation of a numerical solution technique used to analyze the two dimensional

transonic airfoil problem. The full potential equation of motion and the irrotationality condition are used for the governing equations. A coordinate transformation is applied to the governing equations to limit the domain of the problem and for easier application of the boundary conditions. The method of lines is then used to reduce the equations from partial to ordinary differential equations. Solutions obtained using this numerical solution technique are compared to published data for both incompressible and compressible flowfield cases. It is concluded that the solution technique developed in this study is accurate and efficient when analyzing subcritical flowfields around circular airfoil shapes. Author (GRA)

N83-25675# Naval Ship Research and Development Center, Bethesda, Md. Aviation and Surface Effects Dept.
WIND TUNNEL INVESTIGATION OF CARGO EXTRACTION PARACHUTES IN THE WAKE OF A LOCKHEED C-141B STAR-LIFTER AIRCRAFT Final Report, Jul. - Sep. 1981
Gregory G. Huson Aug. 1982 86 p refs
(Contracts MIPR-79-102; MIPR-79-404)
(AD-A124523; DTNSRDC/ASED-82/09) Avail: NTIS HC A05/MF A01 CSCL 01/3

Wind tunnel investigations were conducted to probe the wake of a C-141 aircraft in an airdrop configuration. A rake with twelve 5-hole yaw head probes measured velocities at various positions in the wake, and these measurements were used to compute the vorticity of the wake. In addition, motion pictures and force measurements were taken with three differently sized extraction parachute models attached to the model aircraft by three extraction lines of different lengths. Correlation of parachute behavior with the airflow data indicates that the vortex shed by the inboard flaps and the fuselage-wing junction causes an instability in the performance of the smallest parachute models while the performance of the larger parachute models is relatively unaffected. Author (GRA)

N83-25676# General Dynamics Corp., Fort Worth, Tex.
FORCE AND PRESSURE MEASUREMENTS ON A RESEARCH MODEL WITH A LOW-, MID- AND T-TAIL AT MACH NUMBERS OF 0.60 TO 0.90. VOLUME 2: TABULATED DATA Final Report, 15 Apr. - 14 Dec. 1982
Ronald A. Cox Dec. 1982 850 p 2 Vol.
(Contract N00014-82-C-0340; RF41411801)
(AD-A124068; FZA-540-Vol-2) Avail: NTIS HC A99/MF A01 CSCL 01/3

An investigation of the effects of a low-, mid, and T-Tail on configuration aerodynamics was carried out in the NASA/Ames Research Center 14-Foot Transonic Wind Tunnel. A baseline wing and a wing refined with the use of numerical optimization were tested alone and in conjunction with a horizontal tail in a low-, mid-, and T-Tail arrangement. Wing and horizontal tail pressure data and force data were obtained in the Mach number range 0.60 to 0.90 and at angles of attack from -6 to +28 deg. The all-flying horizontal tail was tested at angles of -10 , 0, and +10 deg. This report presents the complete set of longitudinal aerodynamic data and static pressure data. Volume I presents an analysis and summary of these data. Author (GRA)

N83-25677# Royal Aircraft Establishment, Farnborough (England).
FINITE DIFFERENCE CALCULATION OF AN INVISCID TRANSONIC FLOW OVER OSCILLATING AIRFOILS
T. Ishiguro Oct. 1980 45 p refs Transl. into ENGLISH from Japan Natl. Aerospace Lab. (Japan), no. TR-632, Oct. 1980
(AD-A123982; RAE-LIBRARY-TRANS-2087; DRIC-BR-86199) Avail: NTIS HC A03/MF A01 CSCL 20/4

A procedure is presented to calculate the compressible inviscid pitch. In order to treat precisely boundary conditions on the oscillating airfoil surface and at infinity, the exterior of the airfoil shaped contour in the physical plane is mapped onto a rectangle in a computational plane. The two dimensonal unsteady Euler equations are solved there by the Lax-Wendroff finite difference scheme with artificial viscosity. Test calculations were made for the unsteady flows over the Joukowski airfoil and the NACA 0012 airfoil oscillating in pitch, in order to obtain several individual flow patterns. The resulting unsteady pressure distributions, shock wave locations, etc, are presented. Furthermore, the unsteady numerical results obtained by this procedure for the NLP 7301 airfoil and the NACA 64A010 airfoil are compared with the experimental ones. GRA

N83-25678# Imperial Coll. of Science and Technology, London (England). Dept. of Aeronautics.
TURBULENT VORTEX FLOWS Final Report, 1 Oct. 1978 - 30 Sep. 1981
P. Bradshaw, I. M. M. Shabaka, and R. D. Mehta 12 Mar. 1982 210 p refs
(Contract N00014-78-G-0032; NR Proj. 061-256)
(AD-A124063; IC-AERO-TN-82-103) Avail: NTIS HC A10/MF A01 CSCL 01/1

This report presents the results of mean and fluctuating velocity measurements in three types of longitudinal vortex imbedded in turbulent boundary layers in nominally-zero pressure gradients. Vortex generators were installed upstream of the wind tunnel contraction, so that the vortices entering the working section did not have large associated total-pressure wakes. Measurements include all three components of mean velocity, all second- and third-order (and a few fourth-order) mean products of fluctuating velocities, and surface shear stress, all for at least two streamwise positions for each configuration. Temperature-conditioned sampling measurements, and some flow visualization results, were also acquired. Author (GRA)

N83-25679# McDonnell-Douglas Research Labs., St. Louis, Mo. Flight Sciences Dept.
HIGHER-ORDER COMPUTATIONAL METHODS FOR TRANSONIC WING/BODY FLOWFIELDS Final Report, 16 Mar. 1981-30 Sep. 1982
L. T. Chen 30 Sep. 1982 54 p refs
(Contract N00167-81-C-0057)
(AD-A124079; DTNSRDC/ASED-CR-03-82; MDC-Q0773) Avail: NTIS HC A04/MF A01 CSCL 01/3

This report presents the development of high-order finite-difference schemes for application to transonic wing-body flow calculations. These schemes treat supersonic flows and shocks more accurately than most existing schemes. A transformed full potential equation in a general curvilinear coordinate system is derived, and higher-order operators are introduced. A new shock-point operator produces Mach number jumps at a shock that agree reasonably well with Rankine-Hugoniot values. Second-, and third-order, quasi-conservative, and fully conservative schemes are thereby developed for general geometries where flow directions can be approximately aligned with coordinate lines in supersonic regions. The fully conservative schemes are developed by modifying an existing finite-volume algorithm, while the quasi-conservative schemes are developed by solving the transformed full potential equation directly with the addition of the second- and third-order artificial viscosities at supersonic points, and the corresponding first- and second-order shock-point operators at shock points. Author (GRA)

N83-25680# Naval Surface Weapons Center, White Oak, Md.
VORTEX ASYMMETRY DEVELOPMENT ON A TANGENT OGIVE
William J. Yanta, Andrew B. Wardlaw, Jr., and Daniel Sternklar Oct. 1982 137 p refs
(WR02302)
(AD-A123924; AD-F500119; NSWC/TR-82-394) Avail: NTIS HC A07/MF A01 CSCL 20/4

A rigidly supported tangent ogive model has been tested in low turbulent, incompressible flow at an incidence of 45 deg. A constant streamwise Reynolds number of 1.5 (10(5)) was maintained which produced laminar boundary layer separation. The sharp nose tip was replaced in some tests with a 10% spherically blunted one. In the sharp nose experiments it was found necessary to stabilize the flow field by adding a small trip. Both unsteady surface pressures and flow field velocities in the crossflow plane were measured, the latter with a two component Laser Doppler

Velocimeter. The flow field in the vicinity of the leeside of the model surface, including the primary separation region was examined in detail. Results indicate that the flow field generally features two secondary structures on each side of the model which contain vorticity of opposite sign. Asymmetry starts with the windward crossflow plane streamline from the primary saddle point, which detaches from the body. It appears to be completed when the crossflow plane focus of the shed vortex combines with the primary saddle point. The introduction of nose bluntness is not found to fundamentally change the leeward flow field, although it does significantly reduce the level of asymmetry and the side force magnitude. GRA

N83-25681# Naval Surface Weapons Center, White Oak, Md. Research and Technology Dept.
CALCULATIONS OF FLOWFIELD ABOUT INDENTED NOSE-TIPS
Tsuying Hsieh 23 Aug. 1982 190 p refs
(AD-A125329; AD-F500125; NSWC/TR-82-286) Avail: NTIS HC A09/MF A01 CSCL 12/1

The unsteady implicit numerical procedure for solving Euler or Navier- Stokes equations with thin-layer approximation for hypersonic flows over blunt noses developed by Kutler et. al., is examined and applied to compute the flowfield of hypersonic flows over a series of four severely indented nosetip shapes. For inviscid flows routing calculation fails to give a solution and a special calculation procedure has been developed in order to obtain reasonable solutions. For viscous flows, comparisons of calculated results and measured data are not satisfactory. The calculated temperature field is poor and difficulties to simulate flows with large separation bubble and turbulent flows are described. Consequently, a reanalysis of the complete calculation procedure for solving the full Navier-Stokes equations has been carried out. The original code was then revised by rewriting all the viscous subroutines according to the new analysis for thin-layer theory without turbulence model. The revised code has been applied to compute laminar flow over a hemisphere-cylinder and a sphere-cone. The new results do not show that temperature is a mesh dependent variable as reported by Kutler et al and the temperature field compare well with the available solution for full Navier-Stokes equations and boundary layer calculation. Finally, a coupling of the nosetip code with an existing NSWC supersonic marching code for inviscid afterbody solution has also been carried out. GRA

N83-25682# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
TECHNICAL EVALUATION REPORT ON THE FLUID DYNAMICS PANEL SPECIALISTS' MEETING ON PREDICTION OF AERODYNAMIC LOADS ON ROTORCRAFT
Henry R. Velkoff (Ohio State Univ., Columbus) Feb. 1983 14 p refs Meeting held in London, 17-18 May 1982
(AGARD-AR-189; ISBN-92-835-1445-9) Avail: NTIS HC A02/MF A01

While a broad overview of work being done on (1) rotor blade aerodynamic characteristics, (2) wakes and aerodynamic effects of rotorcraft and wind turbines; and (3) rotor airloads predictions programs was presented, a serious concern remains that the intent of the conferenceas was not fully met. Few papers evidenced experimental correlations of the aerodynamic forcing functions that were at a level similar to the extensive models and codes discussed. Most of the data used for evaluations were structural response data or were dependent on that response. Codes and analysis were not adequately verified. Adequate data bases for verification are not generally available and usually lack important such as flow velocities, pressures, or other measurements taken simultaneously. Experimental efforts were often run independently of the analytical programs and often do not meet the needs of the programs. A.R.H.

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N83-25683# Comptroller General of the United States, Washington, D.C.
A STRATEGY IS NEEDED TO DEAL WITH PEAKING PROBLEMS AT INTERNATIONAL AIRPORTS
24 Mar. 1983 66 p
(GAO/GGD-83-4; B-208444) Avail: NTIS HC A04/MF A01

The role that controlling the timing of flight arrivals could play in coping with the problem of peaking--multiple arrivals of international flights within a limited time period--which causes traveler delays in clearing the Federal inspection process is examined. It was concluded that because of competition, international relations, and other implications of controlling the timing of flight arrivals this course of action should only be considered when all else fails in coping with peaking problems. There is a need to establish criteria for identifying current and anticipated peaking problems affecting international travelers and a concomitant need to gauge the current and potentially enhanced capacity of the Federal inspection operations to overcome these problems. Only then will there be a logical basis for determining the need to control flight arrivals as part of an overall strategy to speed the entry of international travelers. S.L.

N83-25684# Army Research and Technology Labs., Fort Eustis, Va. Applied Technology Labs.
VERIFICATION TESTING OF AN AH-1S WIRE STRIKE PROTECTION SYSTEM (WSPS)
LeRoy T. Burrows Dec. 1982 38 p
(AD-A123188; USAAVRADCOM-TR-82-D-36) Avail: NTIS HC A03/MF A01 CSCL 13/9

The Applied Technology Laboratory conducted developmental and performance verification tests to determine the suitability for AH-1S application of a Wire Strike Protection System (WSPS) designed and fabricated by Bristol Aerospace Limited and Bell Helicopter Textron, Inc. The WSPS tested consisted of an upper cutter, a telescopic sight unit deflector, a chin cutter above the 20mm gun, a lower cutter, and a forward windshield deflector. Using the NASA-Langley Research Center's Impact Dynamics Research Facility, an AH-1S helicopter fitted with the WSPS was subjected to pendulum swing tests into the objective wire, which is a steel, seven-strand, 3/8-inch-diameter cable having an 11,500-pound tensile strength. The WSPS successfully demonstrated its capability to sever the objective wire in all tests, during which impact velocity, impact angle, aircraft pitch attitude, and aircraft impact area were varied. During the WSPS installation it was determined that some WSPS components were not necessary, and these were not necessary, and these were excluded from the system tested. During the test program it was concluded that a small cutter should be added to the system to prevent a wire from hanging up on the air data sensor boom; however, timing did not permit the fabrication and test of such a component. GRA

N83-25685# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ACES II NEGATIVE Gz RESTRAINT INVESTIGATION M.S. Thesis
David G. Leupp Dec. 1982 103 p refs
(AD-A124713; AFIT/GE/EE/82D-45) Avail: NTIS HC A06/MF A01 CSCL 01/3

Seven human subjects, and 5th and 95th percentile male manikins were subjected to -Gz conditions on a man-rated centrifuge to test the restraint effectiveness of the ACES II restraint system used on the A-10, F-15, and F-16. The restraint was tested with shoulder straps locked, unlocked, and unlocked with the addition of a tiedown strap connected between the lap belt and the floor. A -1 Gz condition was created by inverting the centrifuge cab for 30 seconds. Human subjects were exposed to levels of

-1.5 and -2 Gz for 20 and 10 seconds respectively by rotating the centrifuge arm. Manikins were similarly exposed to levels up to -5 Gz. Off-seat displacement was measured directly by a unique spring-loaded transducer mounted in the seat pan. Lap belt and tiedown strap forces, and tracking and ejection task performance were also measured. GRA

N83-25686# INFOCOM, Crawley (England).
FOREIGN TECHNOLOGY ALERT - BIBLIOGRAPHY: TRANSPORTATION SAFETY Final Report, Jan. 1980 - May 1982
Gordon Wilkinson 1982 50 p
(PB83-101659; INFO-FT/82-03) Avail: NTIS HC A03/MF A01 CSCL 01B

Abstracts from the NTIS bibliographic data base relating to ground and air transportation safety are presented in this copyrighted bibliography which describes work originating from countries outside the USA. Most reports are in their native language, but titles are annotated to advise readers of non-English texts. A proportion of foreign language documents have author abstracts and summaries in English. Major subject headings include: traffic engineering and safety; accident research and investigation; hazards and accident prevention; human factors; pedestrian safety; motor vehicles; motor cycles; pedal cycles; traffic control and aviation safety; and rescue systems. Each of the 19 sections is cross-referenced; there is also an author index and useful subject index based on major descriptors. GRA

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N83-25687# Comptroller General of the United States, Washington, D.C.
FAA'S PLAN TO IMPROVE THE AIR TRAFFIC CONTROL SYSTEM. A STEP IN THE RIGHT DIRECTION BUT IMPROVEMENTS AND BETTER COORDINATION ARE NEEDED
GAO 16 Feb. 1983 63 p
(GAO/AFMD-83-34; B-206887) Avail: NTIS HC A04/MF A01

A modernization plan that describes specific improvements in facilities and equipment needed in the air traffic control system was developed. It was recommended that an integrated long range plan addressing all aspects of the National Airspace System including use of the Nation's airspace and airports be developed. Preliminary findings from ongoing airport and airspace reviews should be coordinated with equipment and facility decisions in the modernization plan. The modernization plan should be updated to identify priorities, subsystem costs, and interdependency of projects. Other recommendations are aimed at reducing acquisition costs of the enroute replacement computers and strengthening the management and development of automation and communications systems to alleviate problems identified and statisfy the increased management demands of the system. S.L.

N83-25688# Defense Mapping Agency Aerospace Center, St. Louis, Mo.
PRECISION NAVIGATIONAL FILMSTRIPS FOR USE IN DOD AIRCRAFT
Robert Bozich Sep. 1982 15 p
(AD-A124761) Avail: NTIS HC A02/MF A01 CSCL 17/7

The Defense Mapping Agency Aerospace Center (DMAAC) has been producing high resolution precision aircraft navigation filmstrips since 1969. These filmstrips are used in various type projection systems within Department of Defense (DoD) aircraft to provide the pilot/flight crew with a screen display of position and progress relative to the real world in real time. Superimposed on the projected chart image is an aircraft position symbol that appears to move across the display screen in the direction and at a speed proportionate to that being flown over the ground. DMAAC has produced numerous filmstrips for several operational aircraft today and is currently producing filmstrips for test and evaluation in new aircraft systems which will require support well into the 1980s. GRA

N83-25689# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
PILOT: A PRECISION INTERCOASTAL LORAN TRANSLOCATOR. VOLUME 1: USERS MANUAL Final Report
Charles R. Edwards Mar. 1982 48 p
(AD-A123764; APL/JHU/SDO-5699; USCG-D-21-81-1) Avail: NTIS HC A03/MF A01 CSCL 17/7

PILOT is an electronic aid for navigation in piloting waters. It consists of an OEM microprogrammable graphics terminal configured to receive Loran and ship's gyro inputs. Software in the terminal computes a fix and outputs vessel position in both digital and graphic representation. A number of display modes are available to the operator through a customized 23 key keypad in addition to augmentations such as range and bearing to a point or projection of vessel's future position. Procedures are given for installing PILOT aboard a ship and interfacing it to a Loran receiver. Operating instructions are detailed for all of its navigation and piloting functions. Additionally, a product description of the Internav LC404 Loran receiver is included since this is the unit presently used for PILOT. Author (GRA)

N83-25690# General Accounting Office, Washington, D. C. Mission Analysis and Systems Acquisition Div.
ISSUES CONCERNING THE DEPARTMENT OF DEFENSE'S GLOBAL POSITIONING SYSTEM AS IT ENTERS PRODUCTION
26 Jan. 1983 29 p refs
(AD-A123899; GAO/MASAD-83-9) Avail: NTIS HC A03/MF A01 CSCL 17/7

The Department of Defense's Global Positioning System is a $3.9 billion space-based navigation system designed to provide world-wide position information in 3 dimensions, together with velocity and time information, for a multiplicity of military and civil users. As the system's space segment enters production on a multiyear contract basis, remaining technical and program risks could adversely affect the stability of spacecraft design, achievement of full operational capability by September 1988, and overall program costs. Also, the current multiyear procurement cost estimate associated with the space segment is uncertain because it is not based on a firm price proposal, and associated savings are overstated because they were not calculated using an acceptable method. GRA

N83-25691# Naval Postgraduate School, Monterey, Calif. Dept. of Systems Technology.
SH-3 HELICOPTER/GLOBAL POSITIONING SYSTEM INTEGRATION ANALYSIS M.S. Thesis
Robert Howard Hart Oct. 1982 60 p refs
(AD-A125005) Avail: NTIS HC A04/MF A01 CSCL 17/7

The Global Positioning System (GPS), the transmitted navigational signal, and the overall acquisition approach are explained. Navigational receiver components are functionally described and the hierarchy of platform integration and capability is discussed. Specifically explored is the integration of GPS into the Sikorsky SH-3 Helicopter. Performance comparisons of the medium versus high dynamic receiver, based solely on preliminary simulation data, indicate that at this time the medium dynamic receiver is the optimum configuration. Elimination of he doppler radar in lieu of the five channel receiver would only be possible after through over-water testing of the high dynamic set. The actual velocity accuracy of GPS receivers in a hovering helicopter is the main question yet to be answered. The overall mission effectiveness of the GPS equipped SH-3 Helicopter should be significantly improved because of an accurate, stand-alone navigation system.
Author (GRA)

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N83-25692*# Lockheed Corp., Burbank, Calif.
ADVANCED MANUFACTURING DEVELOPMENT OF A COMPOSITE EMPENNAGE COMPONENT FOR L-1011 AIRCRAFT Quarterly Technical Report, 1 Jul. - 30 Sep. 1978
13 Oct. 1978 106 p
(Contract NAS1-14000)
(NASA-CR-172658; NAS 1.26:172658; LR-28743; DRL-003; QTR-11) Avail: NTIS HC A06/MF A01 CSCL 01C

Work continued toward the development of tooling and processing concepts required for a cocured hat/skin cover assembly. A plan was developed and implemented to develop the process for using preimpregnated T300/5208 with a resin content of 34 + or - 2 percent by weight. Use of this material results in a simplified laminating process because removal by bleeding or prebleeding is no longer required. The approach to this task basically consists of fabricating and testing flat laminated panels and simulated structural panels to verify known processing techniques relative to end-laminate quality. The flat panels were used to determine air bleeding arrangement and required cure cycle. Single and multihat-stiffened panels were fabricated using the established air bleeding arrangement and cure cycle with the resulting cured parts yielding excellent correlation of ply thickness with all surfaces clear of porosity and voids. Author

N83-25693*# Lockheed Corp., Burbank, Calif.
ADVANCED MANUFACTURING DEVELOPMENT OF A COMPOSITE EMPENNAGE COMPONENT FOR L-1011 AIRCRAFT Quarterly Technical Report, 1 Oct. - 31 Dec. 1978
22 Jan. 1979 82 p
(Contract NAS1-14000)
(NASA-CR-172659; NAS 1.26:172659; LR-28843; DRL-003; QTR-12) Avail: NTIS HC A05/MF A01 CSCL 01C

Work on process verification and tooling development continued. The cover process development was completed with the decision to proceed with low resin content prepreg material (34 + or - 3% by weight) in the fabrication of production readiness verification test (PRVT) specimens and the full-scale covers. The structural integrity of the cover/joint design was verified with the successful test of the cover attachment to fuselage ancillary test specimen (H25). Failure occurred, as predicted, in the skin panel away from the fuselage joint at 141 percent of the design ultimate load. With the successful completion of the H25 test, the PRVT cover specimens, which are identical to the H25 ancillary test specimen, were cleared for production. Eight of the twenty cover specimens were fabricated and are in preparation for test. All twenty of the PRVT spar specimens were fabricated and also were prepared for test. The environmental chambers used in the durability test of ten cover and ten spar PRVT specimens were completed and installed in the load reaction frames. Author

N83-25694*# Lockheed Corp., Burbank, Calif.
ADVANCED MANUFACTURING DEVELOPMENT OF A COMPOSITE EMPENNAGE COMPONENT FOR L-1011 AIRCRAFT Quarterly Technical Report, 1 Jan. 1979 - 31 Mar. 1979
20 May 1979 98 p
(Contract NAS1-14000)
(NASA-CR-172657; NAS 1.26:172657; QTR-13; LR-29058; DRL-003) Avail: NTIS HC A05/MF A01 CSCL 01C

Work in process verification and tooling development continued. The decision was made to redesign the ribs to a more producible design. The bead was eliminated and the truss ribs changed to plain C sections. The solid web rib stiffeners were eliminated as well as the beads and the webs are now reinforced with a syntactic core. Syntectic is an epoxy containing glass microballoons. Two cover specimens were successfully tested. The first specimen (H27) was designed to verify the stability and compression strength of the cover when it is hot and wet. Failure occurred at 120 percent of design ultimate load. As the failure appeared to be fixture induced and was limited to one end of the panel, the remainder of the panel will be tested. The second specimen (H28) was designed to verify the failsafe aspects of the design. The test verified the design. Preparation of the PRVT test facility is nearing completion and all ten spar durability specimens were installed in the test chambers. S.L.

N83-25695*# Textron Bell Helicopter, Fort Worth, Tex.
CORRELATION AND EVALUATION OF INPLANE STABILITY CHARACTERISTICS FOR AN ADVANCED BEARINGLESS MAIN ROTOR Final Report
William H. Weller May 1983 85 p refs
(Contract NAS2-11269)
(NASA-CR-166448; NAS 1.26:166448) Avail: NTIS HC A05/MF A01 CSCL 01C

A program of experimental and analytical research was performed to demonstrate the degree of correlation achieved between measured and computed rotor inplane stability characteristics. The experimental data were obtained from hover and wind tunnel tests of a scaled bearingless main rotor model. Both isolated rotor and free-hub conditions were tested. Test parameters included blade built-in cone and sweep angles; rotor inplane structural stiffness and damping; pitch link stiffness and location; and fuselage damping, inertia, and natural frequency. Analytical results for many test conditions were obtained. In addition, the analytical and experimental results were examined to ascertain the effects of the test parameters on rotor ground and air resonance stability. The results from this program are presented herein in tabular and graphical form. Author

N83-25696# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
AIRCRAFT EQUIPMENT RANDOM VIBRATION TEST CRITERIA BASED ON VIBRATIONS INDUCED BY TURBULENT AIRFLOW ACROSS AIRCRAFT EXTERNAL SURFACES
John F. Dreher 1983 13 p refs
(AD-A123281) Avail: NTIS HC A02/MF A01 CSCL 01/3

Vibrations within jet aircraft are caused by a number of phenomena. The principal sources, generally are: jet engine noise and turbulent airflow (pseudo-noise) which impinge on aircraft external surfaces; gust, landing, and takeoff loads; and on-board mechanical equipment such as engines and pumps. This paper describes the structural vibrations induced by turbulent airflow and generalizes the findings to develop pertinent, adaptable random vibration test criteria for aircraft equipment. These criteria are those recently proposed for inclusion in Method 514 of MIL-STD-810C, Environmental Test Methods. Author (GRA)

N83-25697# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
EXPERIMENTAL TESTING OF FLYING QUALITIES THEORIES M.S. Thesis
Nathan H. Krys Dec. 1982 263 p refs
(AD-A124699; AFIT/GE/EE/82D-43) Avail: NTIS HC A12/MF A01 CSCL 14/2

An analog computer simulation was used to model the roll dynamics of the generic aircraft which had been evaluated on the variable stability NT-33A aircraft. Sum of sine waves and random step functions were used as the two different command signals. The purpose of this study was to determine what effect the nature of the command signal had on the pilot rating of the task simulation. Author (GRA)

N83-25698# Army Aviation Engineering Flight Activity, Edwards AFB, Calif.
CLIMATIC LABORATORY SURVEY HUGHES YAH-64 HELICOPTER Final Report, 2 Nov. - 16 Dec. 1981
Gary L. Bender, Charles F. Adam, and Richard T. Savage Mar. 1982 260 p refs
(AD-A124670; USAAEFA-80-07) Avail: NTIS HC A12/MF A01

CSCL 01/3

Environmental testing of the YAH-64 helicopter was conducted in the McKinley Climatic Laboratory, Eglin Air Force Base, Florida. The US Army Aviation Engineering Flight Activity was responsible for the evaluation of aircraft systems and the US Army Aviation Development Test Activity was responsible for the mission equipment evaluation. The test consisted of 14.4 hours of aircraft operating time between 2 November and 16 December 1981. Testing was accomplished at 125, 70, -25, and -50 F with the aircraft attached to the hangar floor. At each temperature, testing consisted of preflight inspections, APU and engine starts, simulated mission profiles, engine shut down, and maintenance inspections. Nine deficiencies were found which would preclude mission accomplishment: (1) the fire control computer was unreliable, (2) the symbol generator required an excessive warm-up time at cold temperatures, (3) the heading and attitude reference system was unreliable, (4) the environmental control unit failed to provide adequate heating or cooling to the cockpit and avionics bays at -25 F, -50 F, and 125 F, (5) the TADS/PNVS and weapons systems did not function adequately at 125 F, (6) the APU aborted its start sequence because it could not accelerate the accessory gearbox to operating speed at -25 F and -50 F, (7) the hydraulic hand pump was ineffective at -25 F and -50 F, (8) the utility hydraulic manifold allowed the accumulator to bleed off at -25 F and -50 F, and (9) failure of the hydraulic flex lines at cold ambient temperatures. GRA

N83-25699# Computational Mechanics Consultants, Knoxville, Tenn.

AN ASSESSMENT OF FACTORS AFFECTING PREDICTION OF NEAR-FIELD DEVELOPMENT OF A SUBSONIC VSTOL JET IN CROSS-FLOW Final Report, Sep. 1981 - Jun. 1982

A. J. Baker and J. A. Orzechowski Warminster, Pa. NADC Jun. 1982 41 p refs

(Contract N62269-81-C-0395)

(AD-A124583; NADC-81177-60) Avail: NTIS HC A03/MF A01 CSCL 01/3

A three-dimensional parabolic Navier-Stokes numerical solution algorithm has been analyzed for prediction of the nearfield flow development of a VSTOL jet in subsonic crossflow. The essential aspects of algorithm definition, with regards to initial and boundary condition specifications, has been summarized. A momentum conserving pressure gradient computation has been developed to complete the problem definition and facilitate problem initialization. A sequence of overlapping interaction solutions has been evaluated for prediction of a circular jet at gamma = 8.0. The results of the 3DPNS predictions shave compared qualitatively with the sparse available experimental data. It is crucial that quality data be acquired to permit quantitative assessment of the results of this analysis procedure. Author (GRA)

N83-25700# Bihrle Applied Research, Inc., Jericho, N. Y.

F-14 ROTARY BALANCE TESTS FOR AN ANGLE-OF-ATTACK RANGE OF 0 DEG TO 90 DEG Final Report

Billy Barnhart Warminster, Pa. NADC Jan. 1983 24 p

(Contract N62269-82-C-0233; WF41400000)

(AD-A124468; NADC-81293-60) Avail: NTIS HC A02/MF A01 CSCL 14/2

A 1/12-scale model of the F-14 was tested on the rotary balance located in the Langley Spin Tunnel. Data were obtained for the basic airplane in the maneuver configuration with various control settings at three wing sweeps. The data were supplied to the Naval Air Development Center on magnetic tape. This report presents a description of these tests and the information supplied on the data tape, as well as a list of spin modes predicted for the F-14 utilizing the rotary balance data. Author (GRA)

N83-25701# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

AN EXPERIMENTAL/ANALYTICAL INVESTIGATION INTO THE PERFORMANCE OF A 20-PERCENT THICK, 8.5-PERCENT CAMBERED, CIRCULATION CONTROLLED AIRFOIL M.S. Thesis

John K. Harvell Dec. 1982 84 p refs

(AD-A124732; AFIT/GAE/AA/82D-13) Avail: NTIS HC A05/MF A01 CSCL 01/3

This study was conducted to investigate the effect of two tangentially blown slots on the performance of a 20-percent thick, 8.5-percent cambered elliptical airfoil. Lift, drag, and moment coefficients were obtained at a test Reynolds number of 9.5 x 100,000 for secondary slot locations of 73.5 and 83.5 deg. Results show that the use of two tangentially blown slots enables the generation of higher lift coefficients at lower blowing rates. This feature enables the test airfoil to equal the performance of single slotted blown airfoils at lower blowing rates therefore reducing the parasitic losses and resulting in higher lift/drag ratios. A limited study of the ability of the (TRACON) program to predict circulation controlled airfoil performance was conducted. The program failed to provide accurate predictions for the pressure distribution or force coefficients for the airfoil configuration of this study. This study also found that using different geometry smoothing techniques in the region of the slot resulted in large variations in TRACON's performance predictions. GRA

N83-25702# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

DESIGN AND ANALYSIS OF A SUBCRITICAL AIRFOIL FOR HIGH ALTITUDE, LONG ENDURANCE MISSIONS M.S. Thesis

Iftikhar Ahmad Dec. 1982 132 p refs

(AD-A124757; AFIT/GAE/AA/82D-1) Avail: NTIS HC A07/MF A01 CSCL 01/3

An airfoil was designed using the 'inverse design' method. The airfoil was tailored to meet the requirements of high altitude, long endurance missions. The cruise Mach number was 0.65 so compressibility effects were included. In the procedure used, a basic airfoil was generated to meet the thickness and moment requirements. It was then refined to ensure desired behavior of the boundary layer at the operating angles of attack. Computer codes designed by Richard Eppler were used for this study. The airfoil was analyzed by using a viscous effects analysis program designed by Shang et al and a comparison was made with results obtained through Eppler's code. GRA

N83-25703# Aeronautical Research Labs., Melbourne (Australia).

RESONANCE TESTS ON THE TAIL OF A CT4 AIRCRAFT

A. Goldman Sep. 1982 27 p

(AD-A124566; ARL/STRUC-TM-345) Avail: NTIS HC A03/MF A01 CSCL 01/3

A resonance test has been carried out on the tail section of a CT4 aircraft. Natural modes and frequencies of the tailplane were measured and these results are presented. Author (GRA)

N83-25704# Systems Technology, Inc., Hawthorne, Calif.

PROPOSED MIL STANDARD AND HANDBOOK: FLYING QUALITIES OF AIR VEHICLES. VOLUME 2: PROPOSED MIL HANDBOOK Final Report, Apr. 1980 - Jul. 1982

Roger H. Hoh, David G. Mitchell, Irving L. Ashkenas, Richard H. Klein, Robert K. Heffley, and John Hidgkinson (McDonnell Aircraft Co.) Wright-Patterson AFB, Ohio AFWAL Nov. 1982 899 p refs

(Contract F33615-80-C-3604; AF Proj. 2403)

(AD-A123726; AFWAL-TR-82-3081-VOL-2) Avail: NTIS HC A99/MF A01 CSCL 01/3

MIL-F-8785C, Military Specification -- Flying Qualities of Piloted Airplanes, has been reformatted into a MIL Standard and a supporting MIL Handbook. This report is a draft of the proposed MIL Standard, which has been developed by Systems Technology, Inc., with the McDonnell Aircraft Company acting in a consulting role. It is presented to industry and the United States armed forces for comments and proposed revisions. The responsibility for the legal MIL Standard and Handbook rests within the armed forces. This draft will be considered and form the basis for revisions, industry and government comments and a tri-service review in the process of developing the MIL Standard and Handbook. Suggested values and background information are contained in this volume. MIL-F-8785C and the backup documents to both it

and its predecessor, MIL-F-8785B, were reviewed extensively. Much of the material contained therein is still considered to be valid and relevant and has been retained in this document.
Author (GRA)

N83-25705# Army Aviation Engineering Flight Activity, Edwards AFB, Calif. Directorate for Development and Qualification.
AIRWORTHINESS AND FLIGHT CHARACTERISTICS TEST. PART 2. YAH-64 ADVANCED ATTACK HELICOPTER Final Report, 8-17 Dec. 1981
Bartholomew D. Picasso, III, Gary T. Downs, Robert M. Buckanin, and John D. Ottomeyer Feb. 1982 152 p refs
(AD-A125270; USAAEFA-80-17-2) Avail: NTIS HC A08/MF A01 CSCL 01/3

The Airworthiness and Flight Characteristics (A&FC) Evaluation Part 2, of the prototype YAH-64 helicopter (S/N 77-23258) was conducted at Palomar Airport, Carlsbad, California (elevation 328 ft.) A total of 12 flights were conducted between 8 December and 17 December 1981 and 14.3 productive hours were flown. Prior to this test significant design changes were incorporated in the flight control system, the digital automatic stabilization equipment (DASE) and the stabilator system to correct objectionable characteristics determined during the airworthiness qualification program. Significant improvements in handling qualities were noted since the previous evaluation. Uncommanded control inputs, caused by recentering of the SAS actuators, upon failure or disengagement of the DASE may cause a potentially hazardous situation. The instrument flight characteristics of the YAH-64 are satisfactory in smooth air but have yet to be evaluated in turbulent conditions. Manual programming of the stabilator in rearward flight did not significantly reduce objectional vibration at the pilot's station. Results of this test have shown that both previously reported deficiencies and 14 shortcomings have been corrected. One deficiency not previously observed, was identified: the possibility of a false indication of dual engine failure following a single engine failure. Two previously unreported shortcomings were also identified. GRA

N83-25706# European Space Agency, Paris (France).
EVALUATION OF AERODYNAMIC DERIVATIVES FROM DO-28-TNT FREE-FLIGHT MODEL TESTS
Martin Marchand Apr. 1983 40 p refs Transl. into ENGLISH of "Bestimmung der Derivate eines Do-28-TNT Modells aus Freiflugversuchen', DFVLR, Brunswick Report DFVLR-FB-82-17, May 1982 Original report in GERMAN previously announced as N83-18711 (ESA-TT-784; DFVLR-FB-82-17) Avail: NTIS HC A03/MF A01; original German version available from DFVLR, Cologne DM 16,50

Free flight tests were conducted on a Do-28-TNT model to determine the derivatives of longitudinal motion. Preprogrammed control inputs were given to the elevator or the flaps during the free flight phase. The mathematical model which included the frequency dependent effects of rapid flap deflection and the pitch rate measuring system is described. Analysis reveals that the dynamics of the measuring circuitry must be considered in the mathematical model. Changes in the resulting derivatives if the time constant of a filter located in the pitch rate channel was not known exactly, or was neglected were examined. In order to determine pitching moment derivatives, a fast combined step input signal is best. For the normal force derivatives a slower input with additional trimming by mass changes is preferable. Comparison of the identifications performed with different mathematical models shows that for an investigation into the influence of nonstationary effects a significantly higher frequency excitation, in the range of 5 to 10 Hz, is necessary. Author (ESA)

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N83-25707*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DESCRIPTION OF THE COMPUTATIONS AND PILOT PROCEDURES FOR PLANNING FUEL-CONSERVATIVE DESCENTS WITH A SMALL PROGRAMMABLE CALCULATOR
Dan D. Vicroy and Charles E. Knox May 1983 37 p refs
(NASA-TM-85642; NAS 1.15:85642) Avail: NTIS HC A03/MF A01 CSCL 01D

A simplified flight management descent algorithm was developed and programmed on a small programmable calculator. It was designed to aid the pilot in planning and executing a fuel conservative descent to arrive at a metering fix at a time designated by the air traffic control system. The algorithm may also be used for planning fuel conservative descents when time is not a consideration. The descent path was calculated for a constant Mach/airspeed schedule from linear approximations of airplane performance with considerations given for gross weight, wind, and nonstandard temperature effects. The flight management descent algorithm and the vertical performance modeling required for the DC-10 airplane is described. Author

N83-25708# Naval Research Lab., Washington, D. C.
THE ELECTROMAGNETIC BIAS OF ALTIMETER MEASUREMENTS OF MEAN SEA LEVEL AS DETERMINED BY AN AIRBORNE 10 GHz RADAR
L. W. Choy, D. L. Hammond, and E. A. Uliana 12 Jan. 1983 17 p refs
(W05270S00; RR1452SB000)
(AD-A123234; NRL-MR-5006) Avail: NTIS HC A02/MF A01 CSCL 01/4

Electromagnetic bias, the small difference that exists between the radar measured mean sea level and the geometric mean sea level is an important issue in high precision satellite altimetry. Present day satellite altimetry has achieved, with SEASAT-1, a precision of 5 cm rms in the range measurement. Future altimeter designs are expected to improve the range measurement precision to 2 cm rms. In order to exploit the capability of these precise radar altimeters for marine geodesy and oceanography, it is necessary to understand and account for all of the known biases in the range measurement. The electromagnetic bias or the EM bias, which has been attributed to the observed fact that ocean wave troughs tend to be better reflectors of nadir viewing microwave radar energy than ocean wave crests, can be observed with high resolution airborne radar. This report presents the results of the EM bias measurements made by NRL using an airborne radar altimeter operating at 10 GHz with a 1 ns range resolution. Data were taken for various sea states and wind conditions. The experimental results are compared with current theories. GRA

N83-25709# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
MODELING THE HELMET-MOUNTED SIGHT SYSTEM M.S. Thesis
Wayne Russell Clubine Dec. 1982 201 p refs
(AD-A124681; AFIT/GE/EE/82D-24) Avail: NTIS HC A10/MF A01 CSCL 17/7

This report describes the development of an error model for the Helmet-Mounted Sight System. This model is designed to generate the HMS aiming errors that are encountered when the sight is used in the Navigation Update role. This report details the research performed to identify, catagorize, and model the Helmet-Mounted Sight (HMS) errors. The HMS error model includes error generated by the human operator, the HMS equipment, the vibration environment, canopy refraction, and the system boresighting procedure. The final portion of this report demonstrates the

performance of this model in a Monte Carlo simulation program.
Author (GRA)

N83-25710# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).
THEORY UNDERLYING THE PERIPHERAL VISION HORIZON DEVICE
K. E. Money Dec. 1982 13 p refs
(AD-A124426; DCIEM-TC-82-C-57) Avail: NTIS HC A02/MF A01 CSCL 01/4

A simple statement of the Peripheral Vision Horizon Device (PVHD) theory is that the likelihood of pilot disorientation in flight can be much reduced by providing a new kind of artificial horizon that will provide orientation information to peripheral vision. In considering the validity of this theory, three questions which are crucial are discussed: (1) Why was the artificial horizon chosen, instead of some other flight instrument? (2) Why is peripheral vision used instead of foveal vision? (3) Is there convincing evidence that peripheral vision is particularly well suited to the processing of orientation information? GRA

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N83-25711*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NASA PROPULSION CONTROLS RESEARCH
Fred Teren 1983 11 p refs Presented at the 6th Intern. Symp. on Air Breathing Engines, Paris, 6-11 Jun. 1983; sponsored by International Society on Air Breathing Engines and Association Aeronautique et Astronautique de France
(NASA-TM-83343; E-1558; NAS 1.15:83343) Avail: NTIS HC A02/MF A01 CSCL 21E

Multivariable control theory is applied to the design of multiple input and output engine controls. Highly-accurate, real-time engine simulations are utilized for control development and checkout. Electro-optical control components are developed for use in electronic control systems having fiber optic data links. Integrated controls are developed for VSTOL and Rotorcraft propulsion systems. Post-stall models of engine systems are developed to aid in understanding and control of post-stall engine behavior.
Author

N83-25712*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DESIGN ANALYSIS OF A SELF-ACTING SPIRAL-GROOVE RING SEAL FOR COUNTER-ROTATING SHAFTS
Eliseo DiRusso May 1983 12 p refs
(NASA-TP-2142; E-1253; NAS 1.60:2142) Avail: NTIS HC A02/MF A01 CSCL 11A

A self-acting spiral groove inter-shaft ring seal of nominal 16.33 cm (6.43 in.) diameter for sealing fan bleed air between counter-rotating hafts in advanced turbofan engines was analyzed. The analysis focused on the lift force characteristics of the spiral grooves. A NASA Lewis developed computer program for predicting the performance of gas lubricated face seals was used to optimize the spiral groove geometry to produce maximum lift force. Load capacity curves (lift force as function of film thickness) were generated for four advanced turbofan engine operating conditions at relative seal speeds ranging from 17,850 to 29,800 rpm, sealed air pressures from 6 to 42 N/sq cm (9 to 60 psi) absolute and temperatures from 95 deg to 327 C (203 deg to 620 F). The relative seal sliding speed range was 152 to 255 m/sec (500 to 836 ft/sec). The analysis showed that the spiral grooves are capable of producing sufficient lift force such that the ring seal will operate in a noncontacting mode over the operating range of typical advanced turbofan engines. Author

N83-25713# Dayton Univ., Ohio. Research Inst.
HIGH FREQUENCY FATIGUE OF TURBINE BLADE MATERIAL Final Technical Report, Oct. 1979 - Jul. 1982
Richard C. Goodman and Alexander M. Brown Wright-Patterson AFB, Ohio AFWAL Oct. 1982 119 p refs
(Contract F33615-79-C-5108; AF Proj. 2418)
(AD-A124585; UDR-TR-82-104; AFWAL-TR-82-4151) Avail: NTIS HC A06/MF A01 CSCL 21/5

This increased fatigue crack growth rate at elevated temperature due to high frequency loading is examined. The crack growth rate is found to depend upon major cycle stress intensity factor, hold-time and minor cycle frequency, and amplitude for a given temperature. The elevated tests also demonstrate a transition from creep crack growth dominant to fatigue crack growth dominant at values of minor cycle amplitude above a threshold value. A model for determining the crack growth rate is developed. GRA

N83-25714# RAND Corp., Santa Monica, Calif.
DEVELOPMENT AND PRODUCTION COST ESTIMATING RELATIONSHIPS FOR AIRCRAFT TURBINE ENGINES Interim Report
J. L. Birkler, J. B. Garfinkle, and K. E. Marks Oct. 1982 81 p refs
(Contract F49620-82-C-0018)
(AD-A123753; RAND/N-1882-AF) Avail: NTIS HC A05/MF A01 CSCL 05/1

This document describes a recent study of cost estimating relationships for new military aircraft turbine engine development and production programs. It presents equations for estimating development and production costs and time of arrival for U.S. military turbojet and turbofan engines. The study derives new cost estimating relationships from an expanded data base and uses new diagnostic statistics to screen the relationships and to evaluate the characteristics of the preferred set. Section two of this note identifies the data used, explains the criteria and rationale for selecting explanatory variables, and describes recently developed regression diagnostics. Section three presents the preferred set of relationships. Comments on these results; a comparison with DAPCA equations; suggestions for the use of the cost estimating relationships and directions for possible future research are discussed in Section four. Supporting statistics for the predictive models are available in the Appendix. Author (GRA)

N83-25715# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
GENERALIZATION OF THE AIR-JET PROPULSION SYSTEMS, THE 'N' FLOW TURBO-JET ENGINE
Virgil Stanciu 9 Dec. 1982 12 p refs Transl. into ENGLISH from Buletinul Inst. Politehnic 'Gheorghe Gheorghiu-Dej' Bucuresti, Ser. Mech. (Romania), v. 43, no. 2, 1981 p 77-84
(AD-A123932; FTD-ID(RS)T-1561-82) Avail: NTIS HC A02/MF A01 CSCL 21/5

The possibility of investigating the performance of airspace propulsion systems on the basis of the characteristics and performance of a generalized propulsion system is considered with emphasis on the performance of the 'n' flow turbojet engine. Out of the analysis of the performance of this engine, the known solutions are obtained by participation: the turbojet engine with simple flow, the turbojet engine with turboflow, and the turbopropulsion engine. The advantages of using a turbojet engine with triple flow are considered. The generalized turbojet engine has a specific performance superior to that of existing engines (higher specific force and lower specific fuel consumption) at the same frontal section. GRA

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N83-25716# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
A PRELIMINARY ASSESSMENT OF HELICOPTER/VSTOL HANDLING QUALITIES SPECIFICATIONS
K. Goldstein 4 Nov. 1982 120 p refs
(WF41400000)
(AD-A124667; NADC-81023-60) Avail: NTIS HC A06/MF A01 CSCL 01/3

The flying quality characteristics of four state-of-the-art rotary wing aircraft have been compared to the present day helicopter and VSTOL flying qualities criteria. Hover control power and dynamic stability characteristics were analyzed for the longitudinal, lateral and directional axes. For forward flight, static and dynamic stability characteristics were analyzed for the longitudinal and lateral-directional axes. Results in terms of the applicability/utility of the MIL-H-8501A criteria are presented for each of the above flying qualities areas. Author (GRA)

N83-25717# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
INVESTIGATION OF AN IMPROVED FINITE ELEMENT MODEL FOR A REPAIRED T-38 HORIZONTAL STABILIZER FLUTTER ANALYSIS USING NASTRAN M.S. Thesis
George Galloway London, Jr. Dec. 1982 47 p refs
(AD-A124741; AFIT/GAE/AA/82D-19) Avail: NTIS HC A03/MF A01 CSCL 20/4

This thesis investigated the use of an improved finite element model of a T-38 horizontal stabilizer for flutter analysis using NASTRAN. The procedure for evaluating the effect of repairs on the flutter speed is developed and its sensitivity to several modeling assumptions and practices is presented. The procedure is to be used by Air Force engineers to evaluate repair limits of T-38 stabs. The results show that the current repair limits have little or no effects on the flutter conditions, therefore, the procedures presented in this investigation should be used to establish new repair limitations. GRA

N83-25718# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
GUST RESPONSE PREDICTION OF AN AIRFOIL USING A MODIFIED VON KARMAN-POHLHAUSEN TECHNIQUE M.S. Thesis
Richard G. Docken, Jr. Dec. 1982 81 p refs
(AD-A124716; AFIT/GAE/AA/82D-9) Avail: NTIS HC A05/MF A01 CSCL 20/4

An analytical study is presented regarding the theoretical behavior of an airfoil in a pitching airflow. The theoretical development includes the momentum-integral equation for boundary layers in unsteady flow and the von Karman-Pohlhausen integral method for unsteady flow. A computer program was written to model this and was applied to a symmetric Joukowski airfoil. The results of this study show a linear relationship between the increase in the stall angle of attack and the non-dimensional pitch rate. GRA

N83-25719# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
FLUTTER PREDICTION IN FORWARD-SWEPT WINGS BY ASSUMED MODES AND STRIP THEORY M.S. Thesis
William I. Shelton, Jr. Dec. 1982 59 p refs
(AD-A124715; AFIT/GAE/AA/82D-27) Avail: NTIS HC A04/MF A01 CSCL 01/1

The roots are then plotted and the flutter or divergence speeds determined. It was found that flutter speed increased and divergence speed decreased with increasing forward sweep as expected. Also, quasi-steady aerodynamics do not accurately predict flutter and the approximation to unsteady aerodynamics does not accurately predict divergence. It is necessary to combine these two methods in order to obtain a complete analysis of the wing's aeroelastic instabilities. GRA

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N83-25720# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. for Experimental Fluid Mechanics.
CONDENSATION STUDIES IN CRYOGENIC NITROGEN EXPANSIONS
M. Dueker [1982] 14 p Presented at the ETW Cryogenic Technol. Review Meeting, Amsterdam, 15-17 Sep. 1982
Avail: NTIS HC A02/MF A01

The Reynolds number range of wind tunnels is extended to higher values, when the wind tunnel operates under cryogenic conditions. With a stagnation temperature, however, chosen too low, the gas may expand into its liquid or solid phase region, which will cause condensation effects. Avoiding impurities in the streaming medium, heterogeneous condensation is prevented, but in an isentropic expansion, far enough into the liquid or solid phase region, homogeneous condensation will occur. The determination of condensation onset points in isentropic expansions around realistic airfoils is tested in the European Tronssonic Wind Tunnel (ETW). Real gas effects in cryogenic flows are not described. Author

N83-25721# Oxford Univ. (England).
TEMPERATURE RESPONSE OF A MODEL TO SET-POINT CHANGES AND CONDITIONING IN ETW
W. B. Bald [1982] 28 p refs Presented at the ETW Cryogenic Review Meeting, Amsterdam, 15-17 Sep. 1982
Avail: NTIS HC A03/MF A01

Preliminary finite element thermal analysis of a model balance sting arrangement mounted in a cryogenic wind tunnel concluded that heated balances were unacceptable if the model surface temperature was to satisfy the 1% adiabatic wall temperature condition specified by Green. The results of a more detailed finite element thermal analysis on an assumed 0.6 meter long stainless steel delta wing model supported by an unheated balance sting arrangement and subjected to the ETW set-point changes and temperature conditioning specified are summarized. Author

N83-25722# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany).
DEVELOPMENT OF A CRYOGENIC WIND TUNNEL BALANCE, PART 2
Wolfgang Lorenz-Meyer 1982 17 p refs Presented at the Cryogenic Technol. Rev. Meeting, Amsterdam, 15-17 Sep. 1982
Avail: NTIS HC A02/MF A01

A six-component wind tunnel balance for cryogenic application was designed and constructed. A description is given of the design, instrumentation, and test setup. Author

N83-25723# Institut de Mecanique des Fluides de Lille (France).
MATERIALS AND MODELLING TECHNOLOGY FOR CRYOGENIC ENVIRONMENT
J. L. Petitniot and F. Dupriez [1982] 41 p refs
Avail: NTIS HC A03/MF A01

Construction of a model and its support for use in a cryogenic wind tunnel induces the following problems relative to the choice of: materials for the different model parts, lifting areas, fuselage, balance, sting line; construction techniques depending on the aim

of the tests to be done; joints between model and its support; joints between model support and wind tunnel structure; and isolated or non-isolated board instrumentation. According to type of tests, solicitations on the model in the test section will be very variable. For static tests, aimed at the determination of aerodynamic coefficients, maximum stress levels were fixed, with the agreement of air frame designers, to 400 MPa for civil and 800 MPa for fighter models. A dynamic stress is added to the static one whose value is of the order of 20% of the static stress. The frequency range lies beyond 30 to 50 Hz. As an example for a Mirage delta 2000 classic 1/8 scale model, first wing flexure mode is about 100 Hz. At this level, the balance stiffness effect becomes preponderant and the first frequencies met in wind tunnel are those of the rigid modes of the model on its support. Author

N83-25724# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).
THE CRYOGENIC WIND TUNNEL COLOGNE
G. Viehweger 1982 21 p Presented at the Cryogenic Technol. Rev. Meeting, Amsterdam, 15-17 Sep. 1982
Avail: NTIS HC A02/MF A01

The low speed wind tunnel in its original conception had a closed circuit and an open test section with a cross sectional area of about 7 square m. After the cryogenic modification the tunnel has an internal insulation and a closed test section of 2,4 m x 2,4 m. The gas temperature is varied between 300 K and 100 K by injecting liquid nitrogen. The velocity is in range of about 5 m/s to 100 m/s, depending on the actual temperature. By cooling down the tunnel, the maximum Reynolds number is increased to more than 8 Mio. Author

N83-25725# Office National d'Etudes et de Recherches Aerospatiales, Toulouse (France). Aerothermodynamics Dept.
PROBLEMS INVOLVED BY THE INSTRUMENTATION AND THE CONCEPTION OF CRYOGENIC TESTS
A. Blanchard and A. Mignosi 1982 14 p refs Presented at the ETW Cryogenic Technol. Rev. Meeting, Amsterdam, 15-17 Sep. 1982
Avail: NTIS HC A02/MF A01

The studies carried out on stall pressure transducers tested at cool temperature, and the development of a probe which was used in T'3 (a small cryogenic transonic wind tunnel driven with a fan) are presented. An important point concerns the precooling of the model, which is necessary in order to obtain a temperature ratio Tw/Taw near 1 during a run (20 to 40 seconds). This precooling is planned to be performed in a cooling box beside the test section; therefore, the model is introduced during the run starting process. To distinguish the effects due to the increase of Reynolds number, from those of specious conditions, the influence of various parameters must be discerned. S.L.

N83-25726# Royal Aircraft Establishment, Bedford (England).
EARLY EXPERIENCE IN USING THE CRYOGENIC TEST FACILITY AT RAE BEDFORD, ENGLAND
R. D. Law 1982 14 p Presented at the ETW Cryogenic Technol. Rev. Meeting, Amsterdam, Sep. 1982
Avail: NTIS HC A02/MF A01

A closed circuit test duct has been constructed at RAE Bedford as part of the United Kingdom support for the ETW programme. The maximum gas velocity through the 0.3 m square test section is 25 m/sec, falling with temperature, and the gas temperature can be rapidly reduced and controlled at any level between ambient and 90 K by evaporation of liquid nitrogen. A simple calibration device is provided for loading small wind tunnel balances mounted in the test duct and some observations have been made of the behavior of a 3-component balance under transient temperature conditions. Author

N83-25727*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MODEL MOUNT SYSTEM FOR TESTING FLUTTER Patent Application
Moses G. Farmer, inventor (to NASA) Filed 31 Mar. 1983 15 p (NASA-Case-LAR-12950-1; US-Patent-Appl-SN-481106) Avail: NTIS HC A02/MF A01 CSCL 14B

A wind tunnel model mount system is described for effectively and accurately determining the effects of angle of attack and airstream velocity on a model airfoil or aircraft. The model mount system includes a rigid model attached to a splitter plate which is supported away from the wind tunnel wall by a plurality of flexible rods. Conventional instrumentation is employed to effect model rotation through turntable and to record model flutter data as a function of the angle of attack versus dynamic pressure. NASA

N83-25728# Federal Aviation Administration, Washington, D.C.
RUNWAY SURFACE CONDITION SENSOR SPECIFICATION GUIDE
22 Apr. 1983 15 p
(AC-150/5220-13A) Avail: NTIS HC A02/MF A01

Ice begins to form on pavements when the pavement surface is at the freezing temperature of the water solution on it. Remote runway surface condition sensors which will predict and detect the formation of ice on airport pavements will enhance runway safety while reducing airport equipment, manpower, and chemical costs. The use of air temperatures exclusively to predict the occurrence of ice on a pavement is not reliable enough, primarily because the temperature differences between pavement surface and ambient air vary so greatly. Factors such as runway surface color and composition, wind patterns, surface water quantity, ice control chemical residue, atmospheric moisture content, traffic, amount of sunlight as well as air temperature all influence ice formation. Since ice prevention is more desirable in terms of safety, time savings and cost than ice removal, primary emphasis should be placed on predicting ice before it actually occurs. Runway sensors thus are a primary tool in developing an effective ice prevention program. S.L.

N83-25729# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DESIGN, FABRICATION AND INSTRUMENTATION OF AN ANNULAR DIFFUSER RESEARCH FACILITY M.S. Thesis
Richard McCrea Moore Dec. 1982 62 p refs
(AF Proj. 3066)
(AD-A124714; AFIT/GAE/AA/82D-20) Avail: NTIS HC A04/MF A01 CSCL 13/9

Annular diffuser and annular diffuser inlet velocity profile data is required to verify theoretical annular diffuser velocity profile prediction techniques. This document records the advancements made during the second phase of an effort to fabricate and instrument an Annular Diffuser Research Facility. A laser doppler velocimeter, which is the primary component of instrumentation, was assembled and proper operation was verified. A stilling chamber was fabricated to provide uniform, non-separated flow at the entrance to the preexisting annular test section components. Velocity profile data was collected and analyzed and repeatability was demonstrated at four axial stations within the annular diffuser and annular diffuser inlet test sections. Author (GRA)

N83-25730# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
A PLACEMENT MODEL FOR FLIGHT SIMULATORS M.S. Thesis
Edward P. Gebhard and John P. ONeill Sep. 1982 139 p refs (AD-A123782; AFIT-LSSR-23-82) Avail: NTIS HC A07/MF A01 CSCL 14/2

The use of flight simulators has been increasing due to the rising costs of operating and maintaining aircraft. At the same time, a drive towards increased simulator fidelity has caused a rapid increase in simulator acquisition and support costs. The rising costs of simulator acquisition and support, coupled with the fact that aircrews assigned to any one of the majority of USAF aircraft types are stationed at numerous geographic locations, provide the impetus to develop an improved methodology for comparing the costs of simulator basing strategies. The methodology includes a comprehensive analysis of the relevant and significant costs of simulator ownership. Using these costs as

inputs, a computer program was developed which incorporates learning curve and present value theory into a facility location algorithm. The program determines the number and location of the simulators to satisfy aircrew training at minimum cost. A demonstration of model capabilities and a sensitivity analysis based on the acquisition of the B-52G Weapon System Trainer are included. Author (GRA)

N83-25731# General Accounting Office, Washington, D. C. Federal Personnel and Compensation Div.
GREATER BENEFITS TO BE GAINED FROM DoD FLIGHT SIMULATORS
14 Nov. 1983 19 p
(AD-A123713; GAO/FPCD-83-4) Avail: NTIS HC A02/MF A01 CSCL 05/9

Our objectives were to determine whether the services are sufficiently analyzing their training needs and identifying those tasks that can best be taught on flight simulators; and whether simulators are training pilots to do the tasks intended. We selected seven flight simulators that were among the services' highest 20 percent in terms of total dollars invested; were used to train personnel for critical jobs (tasks that contribute substantially to readiness); and had been fully operational for at least 2 years. The locations we visited were in geographical areas within large concentrations of simulators. At each location, we examined course syllabi to determine how the simulators were to be used. We also determined how the simulators were being used, benefits derived, and problems with the simulators. GRA

N83-25732# Kaman Avidyne, Burlington, Mass. Structural Mechanics Sect.
NOVA-2S CORRELATION WITH KC-135A FUSELAGE SHOCK TUBE TEST RESULTS Final Report
Lawrence J. Mente and William N. Lee Kirtland AFB, N. Mex. AFWL Nov. 1982 138 p refs
(Contract F29601-81-C-0031; AF Proj. 8809)
(AD-A124013; AFWL-TR-82-101; KA-TR-202) Avail: NTIS HC A07/MF A01 CSCL 20/4

Correlation of the experimental results from KC-135A fuselage tests in the Sandia shock tube with analytical results generated through the NOVA-2LTS structural response code were performed in this effort. It was found that skin buckling between stringers was a very important factor in the overall response of the frames. NOVA-2LTS had to be modified to handle skin buckling in an approximate manner without generating a prohibitive large solution model. Comparisons are made between the experimental results and NOVA-2LTS analytical strain results for the unpressurized and pressurized KC-135A fuselage. Overall the strain response results for the central frame correlated well considering the uncertainities involved in defining structurally an actual large stiffened aircraft section. GRA

N83-25733# Canyon Research Group, Inc., Westlake Village, Calif.
SIMULATOR DESIGN FEATURES FOR CARRIER LANDING. PART 2. IN-SIMULATOR TRANSFER OF TRAINING Interim Technical Report, 1 Sep. 1981 - 31 Aug. 1982
Daniel P. Westra Orlando, Fla. Naval Training Equipment Center Dec. 1982 82 p refs
(Contract N61339-81-C-0105)
(AD-A124024; NAVTRAEQUIPC-81-0105-1; CRG-TR-82-011) Avail: NTIS HC A05/MF A01 CSCL 05/9

The Visual Technology Research Simulator (VTRS) at the Naval Training Equipment Center was used to study the effects of six factors on carrier-landing training. An in-simulator transfer paradigm was chosen in which students were trained under various conditions and then tested under a standard condition that represented maximum realism. The experimental design permitted a relatively large number of variables to be studied, using a relatively small number of student subjects. Results showed some temporary transfer advantages for the wide field of view and high scene detail conditions. Training on straight-in approaches resulted in transfer performance that was better than that produced by training on circling approaches. There was no motion or FLOLS rate cuing effects on the transfer task. Display and simulator transfer effects did not differ between the two pilot groups despite large differences in mean group performances. As a result of these findings, it was suggested that a simulator-to-field transfer study be conducted with field of view, scene detail and approach type as factors. Such a study, using pilots from the target population of undergraduate Naval aviators, would provide the necessary information to make final simulator design decisions for the carrier-landing task. GRA

N83-25734# Army Armament Research and Development Command, Aberdeen Proving Ground, Md. Ballistic Research Lab.
BRL'S 50MM HIGH PRESSURE POWDER GUN FOR TERMINAL BALLISTIC TESTING: THE FIRST YEAR'S EXPERIENCE Final Report
Graham F. Silsby, Raymond J. Roszak, and Louis Giglio-Tos Jan. 1983 49 p refs
(DA Proj. 1L1-62618-AH-80)
(AD-A123861; AD-F300 .87; ARBRL-MR-03236) Avail: NTIS HC A03/MF A01 CSCL 19/4

The first year's operational experience in the BRL Hypervelocity Range is reported here. A 50mm bore by 120 caliber travel smooth bore high pressure powder gun fires into a radiographic terminal ballistic range through an evacuated blast tank. Fifty-eight shots were fired in 1981, permitting establishment of baseline interior ballistic performance data on in-bore masses from 100 to 635 grams, propelling charge masses from 400 to 1000 grams, and breech pressures to 650 MPa, with 20mm ball powder and a custom 35mm M30 propellant. Velocities up to 2645 m/s were achieved. GRA

N83-25735# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
GENERATING AN OUT-THE-WINDOW COCKPIT IMAGE WITH THE IAPX 432 M.S. Thesis
Roger A. Cooper Dec. 1982 136 p refs
(AD-A124852; AFIT/GCS/EE/82D-12) Avail: NTIS HC A07/MF A01 CSCL 09/2

The purpose of this thesis investigation is to determine if a small computer can generate graphic images in a real time environment. The specific computer to be used is the Intel iAPX 432 Micromainframe. The graphic images are to be used as part of an aircraft simulator in a communication performance evaluation test. This thesis investigation contains three areas of study. The first investigation is to study the object-oriented architecture of the Intel iAPX 432. The second investigation is to examine the requirements of the simulator and produce design and implementation details. The third investigation is aimed at studying the F111 DIG ground terrain data base and producing a new data base that the small simulator could use. GRA

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N83-25736# Committee on Science and Technology (U. S. House).
SPACE ACTIVITIES OF THE UNITED STATES, SOVIET UNION AND OTHER LAUNCHING COUNTRIES/ORGANIZATIONS: 1957-1982
Marcia S. Smith Washington GPO Apr. 1983 143 p Presented to the Subcomm. on Space Sci. and Appl. of the Comm. on Sci. and Technol., 98th Congr., 1st Sess., Apr. 1983 Prepared by the Library of Congr., Congr. Res. Serv.
(GPO-19-550) Avail: Subcommittee on Space Science and Applications

The United States and Soviet Union were involved in launching satellites for 25 years. Both programs are large and comprehensive, competing across a broad spectrum of military and civilian applications. While these two nations have been the primary focus of space activities for the past two decades, the 1980s will witness

the emergence of several other governmental space programs. China, the European Space Agency (a group of eleven European countries), India, and Japan all have an existing capability to place satellites into orbit and will increase the competition for both commercial traffic and for international prestige. In addition, these entities may also begin to launch military satellites (probably for reconnaissance purposes), breaking the hold that the United States and Soviet Union have had in obtaining information in this area.
Author

N83-25737*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MATERIALS PROCESSING IN SPACE PROGRAM TASKS
Elizabeth Pentecost, comp. Apr. 1983 152 p
(NASA-TM-82525; NAS 1.15:82525) Avail: NTIS HC A08/MF A01 CSCL 22A

Crystal growth; solidification of metals, alloys, and composites; fluids, transports, and chemical processes; and ultrahigh vacuum and containerless technologies are discussed. Author

N83-25738# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE ROAD THROUGH SPACE
10 Dec. 1982 14 p Transl. into ENGLISH from Hangkong Zhishi (China), n. 2, Feb. 1982 p 20-22
(AD-A123928; FTD-ID(RS)T-1034-82) Avail: NTIS HC A02/MF A01 CSCL 21/8

The difference between liquid propellant rocket engines and other engines (including aircraft engines) lies in the extreme turbulence of its flow produced inside. Several hundred or as much as several thousand kg of fuel are burnt per second in modern rocket engine combustion chambers, which only have a capacity of a few litres. Under these conditions the level of complete combustion is near 1. Combustion chamber pressure goes as high as 200 to 300 ata, the stable state gas temperature as high as 4400 degrees absolute temperature and the launching speed resulting from combustion reaches 4500m/sec. Therefore, the heat flow passing through the combustion chamber wall and the nozzle is extremely great. All these factors combine to make the engine unstable in its operation, since vibration occurs even in a very wide frequency range and thus causes a very big vibration overload. Measures must, therefore, be taken to prevent this from happening.
GRA

N83-25739# MATRA Service Aerodynamique, Toulouse (France).
STUDY ON DISTRIBUTED SYSTEMS SUPPORTING PARALLEL PROCESSING Final Report
A. Dignan Paris ESA Dec. 1982 17 p refs
(Contract ESA-4503/80/NL-PP)
(SDSSPP/DE/008/MI; ESA-CR(P)-1703) Avail: NTIS HC A02/MF A01

The applicability of a distributed system approach for implementing three different systems considered to represent the spectrum of ESA applications is studied. A top level design for each system and an analysis of the common features between these three systems is given. The design complexity is studied by implementing a distributed system design for one of the three systems (space-ground network), chosen because of its similarity with the telematics theme. No present research or application can implement a distributed operating system independent of communication mechanisms, of computer types or of intended applications.
Author (ESA)

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N83-25740# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN INVESTIGATION OF SPIN-ORBIT RESONANCE EFFECTS ABOUT THE GEOSYNCHRONOUS ORBIT M.S. Thesis
Thomas Sean Kelso Dec. 1982 72 p refs
(AD-A124724; AFIT/GSO/AA/82D-2) Avail: NTIS HC A04/MF A01 CSCL 22/3

An investigation of the spin-orbit resonance effects about the geosynchronous orbit was undertaken to determine the existence and feasibility for use of additional stable equilibrium points in this regime for the placement of communications satellites. The Hamiltonian of the geopotential was developed in Delaunay elements using first and second order zonal and sectorial harmonic terms. The resulting Hamiltonian, which was valid for all inclinations and small eccentricities, was reduced to a single degree of freedom through a series of transformations to allow computer generation of phase portraits and analysis of the structure and librational stability. Three resonance bands were discovered, two of which seemed practical for operational use. Although the second of these bands was contained within the primary resonance structure, its width (246 meters) and librational period (625 years) appear useful for satellite placement at the additional stable equilibrium points. Additionally, the general technique was demonstrated as a feasible alternative investigative tool to a purely analytic approach.
Author (GRA)

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

N83-25741# Naval Ocean Systems Center, San Diego, Calif.
A GASDYNAMIC ANALYSIS OF A HIGH SPEED PNEUMATIC MISSILE LAUNCHING SYSTEM Final Report, 15 Apr. - 1 Aug. 1982
S. P. Schneider 30 Sep. 1982 56 p refs
(AD-A124482; NOSC/TD-543) Avail: NTIS HC A04/MF A01 CSCL 20/4

This paper presents an analysis of a high speed compressed air missile launching system, consisting of a reservoir, valve, and launch tube. Simplifying assumptions are discussed and made, a model is determined, and its numerical solution using FORTRAN is presented.
Author (GRA)

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N83-25742* National Aeronautics and Space Administration, Washington, D. C.
INTELSAT COMMUNICATIONS SATELLITE SCHEDULED FOR LAUNCH
13 May 1983 8 p
(NASA-News-Release-83-77; P83-10088) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 22B

To be placed into a highly elliptical transfer orbit by the Atlas Centaur (AC-61) launch vehicle, the INTELSAT V-F satellite has 12,000 voice circuits and 2 color television channels and incorporates a maritime communication system for ship to shore communications. The stages of the launch vehicle and the launch operations are described. A table shows the launch sequence.
A.R.H.

N83-25743 Academy of Sciences (USSR), Moscow. Space Exploration/Research Inst.
CONCERNING QUASI-LINEAR LANGMUIR OSCILLATIONS

WITH HIGH AMPLITUDE MONOCHROMATIC WAVES
M. A. Malkov 1982 23 p refs In RUSSIAN
(PR-710) Copyright. Avail: Issuing Activity

Quasi-linear satellite instability, rise and high amplitude Langmuir waves are plotted. The relationship between monochromatic wave attenuation and satellite instability is examined. The effect of relaxation on terminal wave amplitude apportionment is explored. Transl. by N.W.

N83-25744* National Aeronautics and Space Administration, Washington, D. C.
PIONEER 10 SPACECRAFT DEPARTS SOLAR SYSTEM
7 Jun. 1983 8 p
(NASA-News-Release-83-91; P83-10102) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 22A

Accomplishments of the Pioneer 10 space probe are summarized and the information yet to be obtained as it is tracked through interstellar space is described. Features of its journey are discussed. A.R.H.

N83-25745*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
EVOLUTIONARY SPACE PLATFORM CONCEPT STUDY. VOLUME 1: EXECUTIVE SUMMARY Final Report
May 1982 73 p 3 Vol.
(Contract NAS8-33592)
(NASA-CR-172655; NAS 1.26:172655; MDC-H0072; DPD-610; DR-4) Avail: NTIS HC A04/MF A01 CSCL 22B

The Evolutionary Space Platform Concept Study encompassed a 10 month effort to define, evaluate and compare approaches and concepts for evolving unmanned and manned capability platforms beyond the current Space Platform concepts to an evolutionary goal of establishing a permanent manned presence in space. Areas addressed included: special emphasis trade studies on the current unmanned concept, assessment of manned platform concepts, and utility analysis of a manned platform for defense related missions. Author

N83-25746*# McDonnell-Douglas Corp., Huntington Beach, Calif.
EVOLUTIONARY SPACE PLATFORM CONCEPT STUDY. VOLUME 3: PROGRAMMATICS FOR MANNED SPACE PLATFORM CONCEPTS
May 1982 67 p refs
(Contract NAS8-33592)
(NASA-CR-172656; NAS 1.26:172565; MDC-H0072-Vol-3; DPD-610-Vol-3; DR-4-Vol-3) Avail: NTIS HC A04/MF A01 CSCL 22B

The programmatic data for the reference concept of the Manned Space Platform is presented. Details regarding work breakdown structure (WBS) and dictionary, the facilities and equipment required to produce the modules, the project schedule and logic diagram, a preliminary assessment of environmental impacts and details regarding the estimated costs for the reference concept are included. The proposed WBS which was developed to provide summary and system level segregation of the non-recurring and recurring portions of the Manned Space Platform project is also included. The accompanying dictionary outlines the function and activities contained within each WBS element. The facility and equipment required to produce the various modules is discussed. Generally, required equipment is within the existing state of the art although the size of some of the items to be manufactured is a consideration. A preliminary manufacturing flow was also provided. The project schedules presented consist of the Master Project Summary Schedule, the Master Project Phasing Chart and the Logic Network. S.L.

N83-25747*# General Electric Co., Huntsville, Ala. Military and Data Systems Operations.
DATA SYSTEMS CONCEPTS FOR SPACE SYSTEMS, PHASE 1 Final Report
S. E. Golden and J. W. Neiers 11 Mar. 1983 266 p refs
(Contract NAS5-27154)
(NASA-CR-170509; NAS 1.26:170509; Rept-82HV001) Avail: NTIS HC A12/MF A01 CSCL 22B

Deviations from the traditional spacecraft data systems were studied. A data system architecture was developed from the top down. N.W.

N83-25748*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TELECOMMUNICATIONS AND DATA ACQUISITION SYSTEMS SUPPORT FOR THE VIKING 1975 MISSION TO MARS
D. J. Mudgway 15 May 1983 72 p refs
(NASA-CR-170378; JPL-82-107; NAS 1.26:170378) Avail: NTIS HC A04/MF A01 CSCL 22B

The background for the Viking Lander Monitor Mission (VLMM) is given, and the technical and operational aspects of the tracking and data acquisition support that the Network was called upon to provide are described. An overview of the science results obtained from the imaging, meteorological, and radio science data is also given. The intensive efforts that were made to recover the mission are described. Author

N83-25749# General Accounting Office, Washington, D. C.
COSTS AND USES OF REMOTE SENSING SATELLITES
4 Mar. 1983 14 p
(GAO/RCED-83-111; B-210820) Avail: NTIS HC A02/MF A01

The possible transfer of the Federal government's civilian weather satellites and its land remote sensing satellite (LANDSAT) to the private sector is examined. Specific issues are the costs of the satellites, their use by Federal agencies, and the adequacy of federally sponsored studies of the marketability of LANDSAT data. S.L.

N83-25750# General Accounting Office, Washington, D. C.
U.S. PREPARATIONS FOR AN INTERNATIONAL CONFERENCE ON BROADCAST SATELLITES
4 Mar. 1983 23 p
(GAO/RCED-83-121; B-210778) Avail: NTIS HC A02/MF A01

Areas of the U.S. preparation for the 1983 regional administrative radio conference were addressed including the following: conference background, interagency coordination of preparations, delegation selection and preparation activities, budget planning, preparatory bilateral and multilateral meetings, and computer software development. B.G.

N83-25751*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
ORBITAL TRANSFER AND RELEASE OF TETHERED PAYLOADS. CONTINUATION OF INVESTIGATION OF ELECTRODYNAMIC STABILIZATION AND CONTROL OF LONG ORBITING TETHERS MARTINEZ-SANCHEZ, MANUEL Final Report, 1 Sep. 1979 - 28 Feb. 1983
Giuseppe Colombo, Mario D. Grossi, and David Arnold (MIT) Mar. 1983 66 p refs
(Contract NAS8-33691)
(NASA-CR-170779; NAS 1.26:170779) Avail: NTIS HC A04/MF A01 CSCL 22B

The effect of reeling operations on the orbital altitude of the tether system and the development of control laws to minimize tether rebound upon payload release were studied. The use of the tether for LEO/GEO payload orbital transfer was also investigated. It was concluded that (1) reeling operations can contribute a significant amount of energy to the orbit of the system and should be considered in orbit calculations and predictions, (2) deployment of payloads, even very large payloads, using tethers is a practical and fully stable operation, (3) tether augmented LEO/GEO transfer operations yield useful payload gains under the practical constraint of fixed size OTV's, and (4) orbit to orbit satellite retrieval is limited by useful revisit times to orbital inclinations of less than forty-five degrees. S.L.

N83-25752# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ACTIVE CONTROL OF LINEAR PERIODIC SYSTEM WITH TWO

UNSTABLE MODES M.S. Thesis
Gregory E. Myers Dec. 1982 80 p refs
(AD-A124698; AFIT/GAE/AA/82D-21) Avail: NTIS HC A05/MF A01 CSCL 22/1

The attitude of a spinning symmetric satellite in an elliptical orbit was analyzed. The linearized equations were formed from which the stability was determined using Floquet theory. The majority of satellite configurations examined exhibited two unstable modes. Control laws using pole placement techniques were implemented which stabilized the satellite. A scaler control provided stability but did not allow for exact pole placement of the controlled system. Multiple input control gave exact pole placement but required complicated time dependent gains. GRA

N83-25753# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DUAL-SEEKER MEASUREMENT PROCESSING FOR TACTICAL MISSILE GUIDANCE M.S. Thesis
Andrew C. Weston Dec. 1982 174 p refs
(AD-A124725; AFIT/GE/EE/82D-70) Avail: NTIS HC A08/MF A01 CSCL 17/7

The available measurements from a strapdown seeker and a gimballed seeker onboard an air-to-ground anti-radiation missile are analyzed through an extended Kalman filter simulation. Detailed models of both seekers are developed. Only angular measurements are assumed available from the seekers: angle measurements from the strapdown seeker and angle and angle-rate measurements from the gimballed seeker. A 6-state extended Kalman filter model is used to estimate the ground target's position and relative velocity using the seeker's measurements. Four measurement policies are compared to analyze use of the gimballed seeker early in the missile flight and loss of the strapdown seeker in midflight. The results revealed an observability problem in one channel of the filter, that along the range vector. Analyses were made only by comparisons of performance in the other two channels. The comparisons showed insignificant degradation to filter performance through loss of the strapdown seeker at midflight, and substantial benefit from use of the gimballed seeker as early as possible in the flight. Author (GRA)

N83-25754# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
MODAL CONTROL OF A SATELLITE IN AN UNSTABLE ORBIT ABOUT L3 M.S. Thesis
Frank M. DeArmond Dec. 1982 87 p refs
(AD-A124723; AFIT/GAE/AA/82D-7) Avail: NTIS HC A05/MF A01 CSCL 22/3

A perturbation analysis was done on a satellite in orbit about Language point 3. A modal control scheme for linear systems was then applied to the linear and nonlinear perturbations. Rectification of the satellite orbit was achieved by Encke's Method. The effects of the Moon's inclination and eccentricity on the orbit stability was investigated. The controller stabilized the linear and nonlinear perturbations, with the average control acceleration being of the same order of magnitude as that for Earth-synchronous satellites. GRA

N83-25755# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
POLE PLACEMENT FOR TIME PERIODIC SYSTEMS M.S. Thesis
Carl Stannard Wolf Dec. 1982 51 p refs
(AD-A124737; AFIT/GAE/AA/82D-33) Avail: NTIS HC A04/MF A01 CSCL 12/1

The technique of pole placement was applied to a time varying periodic system. When the control matrix was of full rank, unstable real roots were predictably moved to stable locations. Specified damping was successfully applied to oscillatory roots. In the case of the control matrix having less than full rank a least squares gain was applied. This minimized the error between all desired pole locations and controlled pole locations and as a consequence, prediction of final pole location was not possible. An exact method for predictably placing poles as desired was restricted by a controllability condition. The method was applied to the restricted four-body problem and control of a satellite in a periodic orbit about the Earth-Moon Lagrangian point, L sub 3. A stabilized orbit was obtained for a model which allowed instantaneous control of both position and velocity. Stabilization was not successful in the case of control of velocity only. The least squares solution effected several modes simultaneously. The exact solution for gain was unobtainable as the controllability condition was not met. Author (GRA)

N83-25756# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
A Q-GERT ANALYSIS OF THE SPACE SHUTTLE GROUND TURNAROUND SYSTEM AT VANDENBERG AIR FORCE BASE M.S. Thesis
Steven Graham and Terry W. Jones Sep. 1982 94 p refs
(AD-A123808; AFIT-LSSR-21-82) Avail: NTIS HC A05/MF A01 CSCL 15/5

The efficient ground turnaround of the Space Shuttle is critical to the execution of national policies. Research identified four major subsystems within the Vandenberg Ground Turnaround System; the Orbiter Maintenance Subsystem, External Tank Subsystem, Solid Rocket Booster Subsystem, and Launch Pad Subsystem. A Q-GERT simulation of the ground Turnaround System was conducted to investigate the system and observe the interactions between the major subsystems. The Q-GERT model simulated the integration of Space Shuttle components to determine the subsystem most sensitive to change. The results indicate the Launch Pad Subsystem is the most critical in the Vandenberg Ground Turnaround System. However, further research is recommended in areas of logistics support, spares availability, and transportation of components. GRA

N83-25757# Naval Postgraduate School, Monterey, Calif. Dept. of Aeronautics.
AERODYNAMICALLY EFFICIENT GRADIENT REFRACTIVE INDEX MISSILE SEEKER LENS M.S. Thesis
Herbert M. Carr, III Oct. 1982 484 p refs
(AD-A125167; NPS67-82-012) Avail: NTIS HC A21/MF A01 CSCL 16/4

This thesis explores the use of a pointed seeker lens designed using a spherically symmetric gradient refractive index (GRIN). The design helps to solve the current design conflict between optical quality and aerodynamic drag inherent in hemispherical seeker lenses. Equations for lens design and the evaluation of off-axis lens performance have been developed for both a homogeneous version an d a GRIN version of the pointed seeker lens. The homogeneous lens is used as a comparison and a check for the GRIN lens. A FORTRAN program (GISL) has been written and employed to evaluate and compare both the homogeneous lens and many different configurations of possible GRIN lens designs. Results indicate that the GRIN lens has highly superior off-axis imaging performance as compared to the homogeneous lens. The best results were obtained for the GRIN lens with a fifty percent, positive, spherically symmetric gradient index with center of symmetry interior to the lens. Only very slightly inferior performance was observed with a five percent version of the same lens; such a lens possible can be manufactured today. GRA

N83-25758# Deutsches Geodaetisches Forschungsinstitut, Munich (West Germany). Abt. 1 : Theoritesche Geodaesie.
POPSAT SYSTEM STUDY. SYSTEM AND GROUND SEGMENT DEFINITION AND FEASIBILITY STUDY OF AN EARTH KINEMATICS SATELLITE SYSTEM FOR PRECISE ORBIT POSITIONING (POP) Final Report
Ch. Reigber, K. Kaniuth, J. Cuno, H. Mueller, F. Wakker, L. Aardoom, F. Nouel, F. Barlier, P. Paquet, and Ph. Hartl Paris ESA Jul. 1982 317 p refs Prepared in cooperation with Technische Hogeschool, Delft, Groupe de Recherches de Geodesie Spatiale, Grasse, France, Observatoire Royal de Belgique, Tech. Univ., Berlin
(Contracts ESA-4591/80/F-DD(SC); DGFI-Proj-2/81POPSAT)

(ESA-CR(P)-1693) Avail: NTIS HC A14/MF A01

A satellite system for a solid Earth dynamics monitoring program is proposed. The system features all day, all weather capability; self tracking; a two way X band link with an additional 2 GHz downlink to compensate for ionospheric effects; possibility to serve unattended, automated user stations; and user accessibility to orbit ephemeris for real-time positioning. Fast data transmission and processing is achieved by a closed loop data stream. The system positions points on the Earth's surface with respect to the center of mass with accuracy within 10 cm, and within 5 cm relative to each other. Earth rotation is monitored to within 0.5 m/sec and the spin axis motion to within 10 cm on a continuous basis for 1 day intervals. Author (ESA)

N83-25759# Aeritalia S.p.A., Torino (Italy). Settore Spazio.
POPSAT INDUSTRIAL FEASIBILITY STUDY, VOLUME 1 Final Report
Paris ESA Jun. 1982 75 p refs 2 Vol.
(Contract ESA-4667/81/F-DD(SC))
(PS-RP-AI-002-Vol-1; ESA-CR(P)-1694-Vol-1) Avail: NTIS HC A04/MF A01

It is shown that a spacecraft with the characteristics required by the POPSAT mission can be manufactured at reasonable cost. These characteristics are: acceleration uncertainty due to surface forces of 5 x 10 to the power minus 10 per ms; a power supply of 110 W available continuously to the payload; a laser retroreflector array with an effective reflecting area of 0.04 sq m for any ground station; passive attitude control ensuring that the yaw axis points to Earth with a tolerance of 3 deg; ranging error with radio tracking due to the antenna phase centre displacement with attitude uncertainty of 1 cm; an attitude acquisition time well within 5 days with a probability of 99.9% by means of magnetic coils. Ariane 2 would be a suitable launcher. Author (ESA)

N83-25760# Aeritalia S.p.A., Torino (Italy). Space Sector.
POPSAT INDUSTRIAL FEASIBILITY STUDY, VOLUME 2 Final Report
Paris ESA Jun. 1982 500 p refs 2 Vol.
(Contract ESA-4667/81/F-DD(SC))
(PS-RP-AI-002-Vol-2; ESA-CR(P)-1694-Vol-2) Avail: NTIS HC A21/MF A01

It is shown that a spacecraft with the characteristics required by the POPSAT mission can be manufactured at reasonable cost. These characteristics are : acceleration uncertainty due to surface forces of 5 x 10 to the power minus 10 per ms; a power supply of 110 W available continuously to the payload; a laser retroreflector array with an effective reflecting area of 0.04 sq. m for any ground station; passive attitude control ensuring that the yaw axis points to Earth with a tolerance of 3 deg; ranging error with radio tracking due to the antenna phase centre displacement with attitude uncertainty of 1 cm; an attitude acquisition time well within 5 days with a probability of 99.9 % by means of magnetic coils. Ariane 2 would be a suitable launcher. Author (ESA)

N83-25761# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction des Etudes de Synthese.
LIQUID MOTION EFFECTS ON SPIN-STABILIZED SPACECRAFT. VOLUME 1: SLOSH TESTS AND SCALING
J. P. Guibert Paris ESA Jan. 1982 92 p refs 3 Vol.
(Contract ESA-4401/80/NL-AK(SC))
(ONERA-RT-4/3269-SY-Vol-1; ESA-CR(P)-1701-Vol-1) Avail: NTIS HC A05/MF A01

The state of the art concerning ground experimentation of spinning spacecraft containing liquids is described in order to define the methodology of the tests as concerns the similitude and sealing aspects, with particular emphasis on the case of large tanks. It is shown that not only the usual Froude similitude is involved but also a second Froude number relative to the excitation by gravity. Recommendations including the development of test techniques and the construction of test facilities for large tanks containing about 1000 kg of liquid are included. Author (ESA)

N83-25762# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction des Etudes de Synthese.
LIQUID MOTION EFFECTS ON SPIN-STABILIZED SPACECRAFT. VOLUME 2: EXOSAT SATELLITE THEORY-EXPERIMENT COMPARISON [INFLUENCE DES LIQUIDES SUR LA STABILITE D'UN SATELLITE TOURNANT. COMPARISON THEORIE - EXPERIENCE RELATIVE AU SATELLITE EXOSAT]
H. T. Huynh Paris ESA Feb. 1982 43 p refs In FRENCH 3 Vol.
(Contract ESTEC-4401/80/NL-AK(SC))
(ONERA-RT-5/3269-SY-Vol-2; ESA-CR(P)-1701-Vol-2) Avail: NTIS HC A03/MF A01

Theoretical and experimental values of the energy dissipated by liquids on the EXOSAT satellite are compared. The liquids are propane in an eccentric spherical tank and hydrazine in a centered membrane spherical tank. Liquid sloshing affects the time constant of the precession motion divergence of EXOSAT satellite and the fourth stage of the Ariane launcher. The theoretical analysis is limited to the pendulum type first mode motion and the first mode homogeneous vortex flow. The influence of gravity on these motions is estimated. The experimental measures were done by means of air bearing equipment using various tank positions, liquid filling and liquid viscosity. It is shown that the contribution of the first mode to the total dissipation of energy is small, indicating that the main energy dissipation is produced by internal motion modes. Author (ESA)

N83-25763# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction des Etudes de Synthese.
LIQUID MOTION EFFECTS ON SPIN-STABILIZED SPACECRAFT. VOLUME 3: ANALYTICAL AND EMPIRICAL DETERMINATION
J. P. Guibert Paris ESA Oct. 1982 66 p refs 3 Vol.
(Contract ESTEC-4401/80/NL-AK(SC))
(ONERA-RT-6/3269-SY-Vol-3; ESA-CR(P)-1701-Vol-3) Avail: NTIS HC A04/MF A01

Knowledge concerning dynamical effect of liquid contained in propellant tanks of a spinning spacecraft is presented. The spacecraft inertia ratio needed for attitude motion stability is indicated for all tank shapes (Rumyantsev's criterion); empirical modeling of liquid slosh is also discussed for practical tank configurations. It is pointed out that the so-called mean homogeneous vortex solution appears to be very promising to achieve correct modeling of liquid slosh in any tank shape, even three dimensional, and for any filling ratio. Author (ESA)

N83-25764# Selenia S.p.A., Rome (Italy). Space Activities Div.
IMAGE CODING ON BOARD SCIENTIFIC SATELLITES. REPORT 1: SYSTEM STUDY Final Report
L. Chiariglione (Centro Studi e Laboratori Telecomunicazioni), L. Corgnier (Centro Studi e Laboratori Telecomunicazioni), S. Boesso, M. DiLazzaro, R. Gamberale, and G. dePicardi Paris ESA 3 Sep. 1982 220 p refs 2 Vol.
(Contract ESTEC-4506/80/NL-HP)
(TN-0144/82-Vol-1; ESA-CR(P)-1706-Vol-1) Avail: NTIS HC A10/MF A01

The methods which are used for image redundancy reduction, covering predictive, transformation and clustering techniques are discussed. Onboard application for images with high redundancy-reduction rates is treated. Adaptive techniques, and problems related to practical implementations were considered. Particular transform codings and algorithms are described including statistical optimal transform, singular base decomposition, blob algorithm, recursive clustering, predictive encoding with multispectral extension, and histogram clustering. The guidelines of three working proposals, one for each technique, are drawn up. The implications of using compression algorithms for deep space probes and planetary orbiting platforms are analyzed. Author (ESA)

N83-25765# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abteilung Raumflugdynamik.
APPROXIMATE TV-SAT ORBIT INJECTION OPTIMIZATION BY

MEANS OF IMPULSIVE HOHMANN TRANSFERS
Martin C. Eckstein Oct. 1982 40 p refs
(DFVLR-FB-83-02) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 16,60

The optimal injection strategy for TV-SAT is analyzed using impulsive Hohmann transfers. Considering the constraints imposed by the visibility, the limited thrust arcs and rendezvous time, a method to find an approximate solution for the optimal injection strategy by a sequence of 5 impulses is developed. Flow charts of the computer program are given and results based on the presently assumed transfer orbit are shown. Although the method is approximate, it is a useful tool for mission analysis, provides initial guesses for standard optimization procedures and may be applied to define alternative strategies in case of non-nominal apogee maneuvers. Author (ESA)

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N83-25766*# Beech Aircraft Corp., Boulder, Colo.
PRELIMINARY DESIGN OF FLIGHT HARDWARE FOR TWO-PHASE FLUID RESEARCH
D. C. Hustvedt and R. L. Oonk Feb. 1982 209 p refs
(Contract NAS3-23160)
(NASA-CR-168072; NAS 1.26:168072; BAC-ER-15049) Avail: NTIS HC A10/MF A01 CSCL 22A

This study defined the preliminary designs of flight software for the Space Shuttle Orbiter for three two-phase fluid research experiments: (1) liquid reorientation - to study the motion of liquid in tanks subjected to small accelerations; (2) pool boiling - to study low-gravity boiling from horizontal cylinders; and (3) flow boiling - to study low-gravity forced flow boiling heat transfer and flow phenomena in a heated horizontal tube. The study consisted of eight major tasks: reassessment of the existing experiment designs, assessment of the Spacelab facility approach, assessment of the individual carry-on approach, selection of the preferred approach, preliminary design of flight hardware, safety analysis, preparation of a development plan, estimates of detailed design, fabrication and ground testing costs. The most cost effective design approach for the experiments is individual carry-ons in the Orbiter middeck. The experiments were designed to fit into one or two middeck lockers. Development schedules for the detailed design, fabrication and ground testing ranged from 15 1/2 to 18 months. Minimum costs (in 1981 dollars) ranged from $463K for the liquid reorientation experiment to $998K for the pool boiling experiment. Author

N83-25767*# National Aeronautics and Space Administration, Washington, D. C.
THIRD SPACE SHUTTLE MISSION - STS-3
Miles Waggoner, Gene Marianetti, Austin L. Gaver, Bill Nixon, and James Kukowski Mar. 1982 107 p
(NASA-TM-85342; NAS 1.15:85342) Avail: NTIS HC A06/MF A01 CSCL 22B

News operations, photography, telecommunications, protocol operations, and an education plan are discussed. Author

N83-25768*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
EVOLUTIONARY SPACE PLATFORM CONCEPT STUDY. VOLUME 2, PART A: SASP SPECIAL EMPHASIS TRADE STUDIES
May 1982 100 p refs 3 Vol.
(Contract NAS8-33592)
(NASA-CR-172654; NAS 1.26:172654; MDC-H0072; DPD-610; DR-4) Avail: NTIS HC A05/MF A01 CSCL 22B

Efforts are in progress to define an approach to provide a simple and cost effective solution to the problem of long duration space flight. This approach involves a Space Platform in low Earth orbit, which can be tended by the Space Shuttle and which will provide, for extended periods of time, stability, utilities and access for a variety of replaceable payloads. The feasibility of an evolutionary space system which would cost effectively support unmanned payloads in groups, using a Space Platform which provides centralized basic subsystems is addressed. S.L.

N83-25769*# Bolt, Beranek, and Newman, Inc., Canoga Park, Calif.
SPACE SHUTTLE PAYLOAD BAY ACOUSTICS PREDICTION STUDY. VOLUME 3A: ADDENDUM TO COMPUTER USERS' MANUAL Final Report
J. F. Wilby and E. G. Wilby Jan. 1983 34 p refs
(Contract NAS5-26570)
(NASA-CR-159956; NAS 1.26:159956; BBN-5063) Avail: NTIS HC A03/MF A01 CSCL 20A

Since the publication of the Computer User's Manual for Payload Acoustics Environment for Shuttle (PACES), the analytical model was validated by means of measured data from the first three shuttle lift-offs. During the validation process, new information became available and five changes were made to the input data and the computer program. Three changes affect the user. They are: a revision to the recommended exterior sound pressure levels, a revision to the recommended payload bay acoustic absorption coefficients, and a revision to the vertical station datum for the payload bay. The two other changes do not involve the user. The changes are associated with the output of confidence limits for the predicted space-average sound pressure levels in the payload bay, and a modification to the analytical representation of the payload bay door. The changes are discussed briefly in this Addendum to the Computer User's Manual. Author

N83-25770# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN ANALYSIS OF THE SPACE TRANSPORTATION SYSTEM LAUNCH RATE CAPABILITY UTILIZING Q-GERT SIMULATION TECHNIQUES M.S. Thesis
John Gregory Andrusyszyn and Brian Grogan Millburn Dec. 1982 155 p refs
(AD-A124706; AFIT/GSO/OS/82D-1) Avail: NTIS HC A08/MF A01 CSCL 09/2

The Space Transportation System (STS) is being developed by NASA for NASA, DoD, and commercial use. National Space Policy dictates that the STS become NASA's and DoD's primary means for launching payloads into orbit. Unfortunately, the current flight manifest saturates STS launch rate capability. Therefore, additional operational funding will be required to increase the rate of launch. This funding must be applied to those portions of the system which contribute greatest to increasing the system launch rate. This study presents two methods for determining the system launch rate, identifying the bottlenecks, and developing a launch enhancement plan. The analytic method is fairly easily and quickly accomplished, using the data provided in the NASA Shuttle Turn-around Analysis Report, while the Q-GERT simulation method gives more accurate estimates of the launch rate capability. Plans are presented to show the facility configurations and flight hardware levels required to achieve various launch rate capabilities at Kennedy Space Center. The capacity of VAFB was determined, but no launch enhancement plan was developed since an increase in the launch rate would require the obvious duplication of most of the facilities. The method presented can be used on data provided in future STARs. Author (GRA)

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

No abstracts in this category.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N83-25771# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DECENTRALIZED CONTROL OF A LARGE SPACE STRUCTURE AS APPLIED TO THE CSDL 2 MODEL M.S. Thesis
Edward Sherman Aldridge Dec. 1982 141 p refs
(AD-A124702; AFIT/GA/AA/82D-1) Avail: NTIS HC A07/MF A01 CSCL 22/2

Modern optimal control methods are used to develop a multiple, input multiple output controller which is applied to two models: CSDL 1 and CSDL 2. NASTRAN is employed to generate modal approximations of both models. Twelve selected modes are analyzed in both models. The control problem is formulated in state vector form and full state feedback is implemented. The state is represented as modal amplitudes and rates and the feedback gains are generated using steady state optimal regulator theory. State estimates are provided by means of a deterministic observer. System outputs are obtained by position sensors and control is applied by point force actuators. Control and observation spillover are eliminated using singular value decomposition. Decentralized control is accomplished using three and four controllers on both models. Conditions for which the stability of each model is asured are developed. On both models, there is a significant increase in the closed loop damping achieved. Losses in controllability and observability are noticed during spillover elimination. Full controller decoupling is achieved and stability is maintained. Author (GRA)

N83-25772# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
ACOSS-11 (ACTIVE CONTROL OF SPACE STRUCTURES), VOLUME 1 Interim Report, Nov. 1981 - Apr. 1982
Thomas H. Brooks and Virendra N. Mahajan Griffiss AFB, N.Y. RADC Nov. 1982 62 p 2 Vol.
(Contract F30602-81-C-0180; ARPA Order 3655; AF Proj. C655) (AD-A124745; CSDL-R-1538-Vol-1; RADC-TR-82-295-Vol-1) Avail: NTIS HC A04/MF A01 CSCL 09/2

In analysis and simulation of space-based surveillance system performance, a key variable is the scene/sensor integration. Photon Research Associates is developing a software package capable of generating a manipulating terrestrial scene data sets as a function of major surveillance system and mission parameters. This package, when incorporated into the Draper Integrated Simulations, will result in a broad and comprehensive tool for the analysis and simulation of space based surveillance system performance. GRA

N83-25773# Royal Aircraft Establishment, Farnborough (England).
THE LAST 14 DAYS OF SKYLAB 1: ORBIT DETERMINATION AND ANALYSIS
Doreen M. C. Walker Jun. 1982 45 p refs
(AD-A124609; RAE-TR-82067; BR85449) Avail: NTIS HC A03/MF A01 CSCL 22/3

The orbit of Skylab 1 (1973-27A) has been determined using some 1400 NORAD observations during the 14 days prior to decay on 1979 July 11. There are 14 daily orbits, with standard deviations corresponding to average accuracies of 40 m cross track and 30 m radial. A 15th orbit, only slightly less accurate, was determined from observations on July 11 between the manoeuvre at 07.45 UT and decay at 16.37 UT. The variations in inclination due to atmospheric rotation and 16th-order resonance with the geopotential have been successfully analysed, to give the first values of 16th-order geopotential coefficients determined from resonance, and a value of 1.10 + or - 0.07 rev/day for the atmospheric rotation rate at a height of 210-220 km. The daily changes in semi-major axis have been used to determine 13 daily values of air density, at heights from 252 km down to 179 km. All agree well with the CIRA 1972 model, and indicate a smaller semi-annual variation than in the early 1970s. The variations of eccentricity and argument of perigee take unusual forms, but detailed analysis shows that the variations are in full accord with the theory for an atmosphere with day-to-night variation in density, with the perigee progressing towards the point of minimum density. Author (GRA)

N83-25774# Tri-Con Associates, Inc., Cambridge, Mass.
THE DESIGN DEVELOPMENT AND TEST OF A PULSE MONITOR SYSTEM Final Report, 1 Aug. 1980 - 31 Aug. 1982
Chester G. Kuczun 19 Nov. 1982 56 p
(Contract F19628-80-C-0164; AF Proj. 7661)
(AD-A123973; C-197; AFGL-TR-82-0339) Avail: NTIS HC A04/MF A01 CSCL 20/3

The objective of this contract was to design instrumentation to sense electrical breakdown phenomena on or near the surface of a spacecraft due to environmental or spacecraft surface charging induced by natural means and/or by charge emission by onboard devices. These discharges were characterized by measuring their polarity, peak amplitude, maximum duration, number, and total energy for successive one second sample intervals. Author (GRA)

N83-25775# European Space Agency, Paris (France).
STUDY OF THE LIMIT CHARACTERISTICS OF THE TECHNOLOGIES EMPLOYED IN ONBOARD SUPPORT EQUIPMENT
J. M. Garrigue Apr. 1983 194 p refs Transl. into ENGLISH of "Etude de la Caracterisation aux limites des Technol. Utilisees dans les Equipements de Servitude Embarques', CNES, Toulouse Report CNES-81/QPE/FT/402, Oct. 1981 Original report in FRENCH previously announced as N83-11212
(ESA-TT-764; CNES-81/QPE/FT/402) Avail: NTIS HC A09/MF A01

The behavior of electronic packaging for space applications was studied through research and analysis of the limit of each elementary technology associated with low frequency, high frequency and logical electronic functions. Electronic and interfacing parts, encapsulation materials, and the main technological families used in space were investigated. Assembled units suffer from restrictive interactions, but benefit from adapted arrangements, and can exceed limitations of individual components. Assembly technologies are immune to mechanical stresses > 150 g. No malfunction or damage in subassemblies during the centrifuging tests carried out to the maximum capability of the test equipment is reported. Component connections withstand stresses from masses multiplied by factors of 200 to 240 in a steady state (for 20 sec) and from 100 to more than 340 in transient state. The forces were applied along the most disadvantageous layout axis. Author (ESA)

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N83-25776# Marconi Co. Ltd., Chelmsford (England). Research Center.

STUDY OF A THREE BEAM SCATTEROMETER Final Report
D. J. Smith, R. P. Cox, G. D. Chapman, R. F. E. Guy, C. J. Hodge, A. P. Luscombe, J. T. Macklin, I. McMillan, and S. Rotheram Paris ESA Sep. 1982 189 p refs
(Contract ESA-5072/82/F-CG(SC))
(MTR-82/72; ESA-CR(P)-1691) Avail: NTIS HC A09/MF A01

A wind scatterometer employing three beams at different look angles but operating with the same beam polarization was investigated. System configuration versus performance; calibration; and the electronics, including the switch matrix, data processing and configuration are considered. Methods for improving the system performance are discussed. The possibility of coherent scatterometry is explored. Author (ESA)

N83-25777# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
STUDY OF A THREE BEAM SCATTEROMETER Final Report
P. Hans, H. Hoelzl, D. Miller, H. Schuessler, B. Theile, and Wagner Paris ESA Sep. 1982 147 p
(Contract ESA-5071/82/F-CG)
(ESA-CR(P)-1692) Avail: NTIS HC A07/MF A01

The ERS-1 scatterometer system design, system definition and hardware are discussed. The scatterometer measures wind vectors at given nodes at 50 km spacing, located within a 400 to 500 km swath parallel to the satellite track. Each node is illuminated from three look directions by two-dimensional illumination functions. Comparison of node-hitting strategies indicates that yaw steering gives best results and provides natural time windows for wave mode operation. Measurement timing, link and error budgets and the system parameters are indicated. Separation of SAR and scatt antennas is advantageous as regards antenna design, but requires extra space in the payload configuration. Author (ESA)

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N83-25778*# Mississippi State Univ., Mississippi State. MHD Energy Center.
CARS TEMPERATURE MEASUREMENTS IN THE FUEL PREBURNER OF THE SPACE SHUTTLE MAIN ENGINE: A FEASIBILITY STUDY Final Report
E. J. Beiting and J. C. Luthe Mar. 1983 94 p refs
(Contract NAS8-34907)
(NASA-CR-170764; NAS 1.26:170764) Avail: NTIS HC A05/MF A01 CSCL 21H

This report discusses the feasibility of making temperature profile measurements in the fuel preburner of the main engine of the space shuttle (SSME) using coherent anti-Stokes Raman spectroscopy (CARS). The principal thrust of the work is to identify problems associated with making CARS measurements in high temperature gas phase hydrogen at very high pressures (approx 400 atmospheres). To this end a theoretical study was made of the characteristics of the CAR spectra of H2 as a function of temperature and pressure and the accuracy with which temperatures can be extracted from this spectra. In addition the experimental problems associated with carrying out these measurements on a SSME at NSTL were identified. A conceptual design of a CARS system suitable for this work is included. Many of the results of the calculations made in this report are plotted as a function of temperature. In the course of presenting these results, it was necessary to decide whether the number of density or the pressure should be treated as a fixed parameter. B.W.

N83-25779*# Hughes Research Labs., Malibu, Calif.
ENDURANCE TEST OF A 30-CM-DIAMETER ENGINEERING MODEL ION THRUSTER. TASK 12: INVESTIGATION OF THIN-FILM EROSION MONITORS FOR ION THRUSTERS Final Report, 5 Feb. 1981 - 30 Jun. 1982
J. R. Beattie May 1983 41 p refs
(Contract NAS3-18914)
(NASA-CR-168132; NAS 1.26:168132) Avail: NTIS HC A03/MF A01 CSCL 21C

An investigation of short term measurement techniques for predicting the wearout of ion thrusters resulting from sputter erosion damage is described. The previously established laminar thin film techniques to provide high precision erosion rate data. However, the erosion rates obtained using this technique are generally substantially higher than those obtained during long term endurance tests (by virtue of the as deposited nature of the thin films), so that the results must be interpreted in a relative sense. Absolute measurements can be performed using a new masked substrate arrangement which was developed during this study. This new technique provides a means for estimating the lifetimes of critical discharge chamber components based on direct measurements of sputter erosion depths obtained during short duration (10 hour) tests. The method enables the effects on lifetime of thruster design and operating parameters to be inferred without the investment of the time and capital required to conduct long term (1000 hour) endurance tests. Results obtained using the direct measurement technique are shown to agree with sputter erosion depths calculated for the plasma conditions of the test and also with lifetest results. The direct measurement approach is shown to be applicable to both mercury and argon discharge plasma environments and should be useful in estimating the lifetimes of inert gas and extended performance mercury ion thrusters presently under development. Author

N83-25780# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN EXPERIMENTAL STUDY OF CLUSTER NOZZLE PERFORMANCE M.S. Thesis
James T. Lester, Jr. Dec. 1982 94 p refs
(AD-A124677; AFIT/GAE/AA/82D-18) Avail: NTIS HC A05/MF A01 CSCL 21/8

Clusters of up to ten converging-diverging supersonic nozzles were cold flow tested at ambient conditions to determine their thrust performance as compared to a single nozzle of the same total throat area. The nozzles were operated at both underexpanded and overexpanded conditions, and no significant thrust difference was detected between the clusters and single nozzles. Schlieren photographs verified no interference between the jets of different nozzles. Clusters with various patterns of flowing and non-flowing nozzles were also tested. The non-flowing nozzles had no effect on the flowing nozzles except when, due to the sealed nozzles, the base plate area was greatly increased. The increased base plate area resulted in a noticeable improvement of thrust over theoretical throughout the pressure ratio range tested with the greatest increase in the underexpanded region. Aerodynamic shrouding was placed on the clusters and tested. There was a very slight decrease in thrust performance associated with a decrease in the base plate effect. GRA

N83-25781# Space Vector Corp., Northridge, Calif.
DESIGN AND FABRICATE ROCKET ATTITUDE CONTROL SYSTEM (ACS) FOR ACCURATE PAYLOAD ORIENTATION AND CONTROL FUNCTIONS Final Report, 10 Aug. 1977 - 30 Apr. 1982
Robert E. Scarboro Hanscom AFB, Mass. AFGL 14 May 1982 7 p
(Contract F19628-77-C-0251; AF Proj. 7670)
(AD-A123735; AFGL-TR-82-0289) Avail: NTIS HC A02/MF A01 CSCL 22/2

Three (3) Attitude Control Systems (ACS) were designed and built for SPICE, IRBS, ZIP, and FIRSSE (Background Measurements) programs. They utilized star tracker, IRU, and MIDAS

platforms. The IRU system gives state-of-the-art accuracy.
Author (GRA)

N83-25782# Air Force Rocket Propulsion Lab., Edwards AFB, Calif. Structural Integrity Sect.
ITERATIVE CURVE FIT OF A POWER LAW EQUATION TO SOLID PROPELLANT SHIFT FACTOR DATA Special Progress Report, Jun. 1981 - Jan. 1982
Charles R. Farrar and Durwood I. Thrasher Nov. 1982 31 p refs
(AF Proj. 5730)
(AD-A124112; AFRPL-TR-82-078) Avail: NTIS HC A03/MF A01 CSCL 21/9

Software was developed for an HP-9815A programmable calculator which optimizes the constants of a single-valued algebraic or transcendental equation to fit a given set of experimental data. This technique was used to fit a power law equation to solid propellant shift factor vs temperature data. The results were compared to optimization methods suggested by the JANNAF Solid Propellant Structural Integrity Handbook and to the Power Law approximation reported in AFRPL-TR-81-66 for the same data.
Author (GRA)

N83-25783# Louisiana State Univ., Baton Rouge. Dept. of Mechanical Engineering.
MAGNETO GAS DYNAMICS MODEL OF THE INTER-ELECTRODE FLOW IN A PULSED PLASMA THRUSTER Final Report, May 1981 - May 1982
Daniel W. Yannitell Aug. 1982 32 p refs
(Grant AF-AFOSR-0137-81; AF Proj. 2308)
(AD-A125161; AFOSR-83-0017TR) Avail: NTIS HC A03/MF A01 CSCL 21/8

A set of basic equations necessary to model the acceleration of the plasma produced by a millipound pulsed plasma thruster is presented and discussed. Various simplifying assumptions and approximations typically made in the derivation of magnetogasdynamic equations are examined in light of available experimental data. In particular, it is shown that the mean free path and Debye shielding length are appropriate to the assumption of a neutral continuum with pressure and Lorentz force dominating the acceleration. The neglect of displacement current is also justified and a case is made for the assumption of scalar rather than tens or thermal and electrical conductivities and the neglect of viscous effects. The possibility of describing the flow with a model of fewer than three dimensions is discussed and a drastically simplified one-dimensional model is presented, along with a discussion of its limitations and shortcomings. A finite difference algorithm for the one-dimensional model is presented, but difficulties, apparently arising from incorrect boundary conditions prevented meaningful numerical experimentation. Additional investigation of this problem has been undertaken through a program at the Air Force Rocket Propulsion Laboratory, and the results will appear in an AFRPL report.
Author (GRA)

N83-25784# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. for Experimental Fluid Dynamics.
A STUDY OF ROCKET EXHAUST PLUMES AND IMPINGEMENT EFFECTS ON SPACECRAFT SURFACES: EXECUTIVE SUMMARY Executive Summary
R.-D. Boettcher, G. Dettleff, G. Koppenwallner, and H. Legge Paris ESA Mar. 1982 57 p refs
(Contract ESA-4154/79/NL-AK)
(DFVLR-IB-222-82-A-11; ESA-CR(P)-1698) Avail: NTIS HC A04/MF A01

Computation of the plume flow quantities and of the resulting impingement force and moment by simple models is treated. The main features of the plume flow and of the plume impingement process are outlined. Theoretical concepts for plume flow models and impingement models in continuum, transition and free molecular flow are presented. Results for typical thrustors and impingement calculations for the OTS and ECS satellites are outlined. Computer programs developed to analyze plumes are described.
Author (ESA)

N83-25785# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
SYSTEM STUDY CONCERNING THE DEFINITION OF STANDARD SPACECRAFT POWER INTERFACE CHARACTERISTICS
H. Hufnagel Paris ESA Jun. 1982 130 p
(Contract ESTEC-4599/81/NL-PP(SC))
(MBB-RT-221; ESA-CR(P)-1713) Avail: NTIS HC A07/MF A01

Aspects relative to the standardization of power interface characteristics were investigated including end to end regulated power bus, dedicated bus approach, AC bus and interface concept, power source impedances, solar array available power, time utilization of power subsystem units in geostationary orbits, solar array latch-up phenomena, and realization and validation of nonregulated bus approaches. Standardization of power interface characteristics is feasible. The nonregulated DC bus is the most promising candidate, with minimum end to end mass, complexity and cost. The associated user power conditioning, being prepared to operate on varying input voltage, can be used for existing DC standards of 28 and 50 V as well as for nonregulated DC buses. This prime nonregulated DC bus can also be taken as a basis for an economical AC power distribution using DC/AC inverters.
Author (ESA)

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N83-25786*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
KINETICS OF COPPER ION ABSORPTION BY CROSS-LINKED CALCIUM POLYACRYLATE MEMBRANES
Warren H. Philipp and Charles E. May Feb. 1983 11 p refs
(NASA-TM-83052; E-1506; NAS 1.15:83052) Avail: NTIS HC A02/MF A01 CSCL 07C

The absorption of copper ions from aqueous copper acetate solutions by cross-linked calcium acrylate membranes was found to obey parabolic kinetics similar to that found for oxidation of metals that form protective oxide layers. For pure calcium polyacrylate membranes the rate constant was essentially independent of copper acetate concentration and film thickness. For a cross-linked copolymer film of polyvinyl alcohol and calcium polyacrylate, the rate constant was much greater and dependent on the concentration of copper acetate. The proposed mechanism in each case involves the formation of a copper polyacrylate phase on the surface of the membrane. The diffusion of the copper ion through this phase appears to be the rate controlling step for the copolymer film. The diffusion of the calcium ion is apparently the rate controlling step for the calcium polyacrylate. At low pH, the copper polyacrylate phase consists of the normal copper salt; at higher pH, the phase appears to be the basic copper salt. Author

N83-25787# Geo-Centers, Inc., Newton, Mass.
THE OXIDATION STABILITY OF DEUTERATED ESTERS
Jan. 1983 54 p refs
(Contract N00014-80-C-0462)
(AD-A124558; GC-TR-83-182) Avail: NTIS HC A04/MF A01 CSCL 11/8

In both civilian and military systems the demand for lubricants exhibiting superior performance characteristics over a wide temperature range has increased dramatically since World War II. Neopentyl polyol esters introduced in the 1960s are a group of synthetic lubricants which meet these requirements. These esters exhibit very good thermal and oxidative stability at high temperatures (> 200 degrees C), excellent viscosity-temperature characteristics, and low pour and freeze points (-55 degrees C). Consequently, for adequate performance at high temperatures (220 degrees C), the neopentyl polyol esters have replaced the

petroleum based fluids and the diesters, which were used prior to the 1940s and 1950s, respectively. GRA

N83-25788# Army Armament Research and Development Command, Aberdeen Proving Ground, Md. Chemical Systems Lab.
IDENTIFICATION OF VOLATILE ORGANIC COMPOUNDS IN WATER BY GAS CHROMATOGRAPHY/MASS SPECTROMETRY USING PURGE-AND-TRAP SAMPLE CONCENTRATION AND INTRODUCTION Technical Progress Report, Apr. - Nov. 1980
Bruce T. Heitke Jan. 1983 25 p refs
(AD-A124404; ARCSL-TR-82034) Avail: NTIS HC A02/MF A01 CSCL 13/2

The objective of this investigation was to evaluate the purge and trap methods and the Hewlett-Packard model 7675A purge-and-trap sampler for the identification of volatile compounds in water by gas chromatography/mass spectrometry. The manner in which this instrument accomplished the transfer of volatile components in water to the chromatographic column is thoroughly described. Guidance is given to the analyst in the specification of operating parameters for the optimization of this transfer. The instrument was evaluated with both packed and capillary columns by using: (1) the volatile organics among Environmental Protection Agency's (EPA's) priority pollutants and (2) ground water samples from Rocky Mountain Arsenal. The Hewlett-Packard model 7675A purge-and-trap sampler proved to be adequate for identifying removable organic compounds in water at concentrations of 4 ng/ml (4 ppb) provided that packed-column chromatography is sufficient to resolve the components. This instrument is not suitable for capillary column applications. GRA

24 COMPOSITE MATERIALS

Includes laminates.

N83-25789* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
METHOD OF CARBONIZING POLYACRYLONITRILE FIBERS Patent
Domenick E. Cagliostro and Narcinda R. Lerner, inventors (to NASA) Issued 24 May 1983 4 p Filed 10 Jul. 1981
(NASA-Case-ARC-11261-1; US-Patent-4,385,043;
US-Patent-Appl-SN-282129; US-Patent-Class-423-447.6;
US-Patent-Class-423-447.2; US-Patent-Class-423-447.7) Avail: US Patent and Trademark Office CSCL 11D

This invention relates to a method of carbonizing polyacrylonitrile fibers by exposing the fibers at an elevated temperature to an oxidizing atmosphere; then exposing the oxidized fibers to an atmosphere of an inert gas such as nitrogen containing a carbonaceous material such as acetylene. The fibers are preferably treated with an organic compound, for example benzoic acid, before the exposure to an oxidizing atmosphere. The invention also relates to the resulting fibers. The treated fibers have enhanced tensile strength. Official Gazette of the U.S. Patent and Trademark Office

N83-25790*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EVALUATION OF LOW-COST ALUMINUM COMPOSITES FOR AIRCRAFT ENGINE STRUCTURAL APPLICATIONS
D. L. McDaniels and R. A. Signorelli 1983 31 p refs Presented at the 112th Ann. Meeting of the Met. Soc. of the Am. Inst. of Mining, Met. and Petroleum Engineers, Atlanta, 6-10 Mar. 1983
(NASA-TM-83357; E-1618; NAS 1.15:83357) Avail: NTIS HC A03/MF A01 CSCL 11D

Panels of discontinuous SiC composites, with several aluminum matrices, were fabricated and evaluated. Modulus, yield strength and tensile strength results indicated that the properties of composites containing SiC whisker, nodule or particulate reinforcements were similar. The modulus of the composites was controlled by the volume percentage of the SiC reinforcement content, while the strength and ductility were controlled by both the reinforcement content and the matrix alloy. The feasibility of fabricating structural shapes by both wire performs and direct casting was demonstrated for Al2O3/Al composites. The feasibility of fabricating high performance composites into structural shapes by low pressure hot molding was demonstrated for B4C-coated B/Al composites. Author

N83-25791*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
TOUGHENING REINFORCED EPOXY COMPOSITES WITH BROMINATED POLYMERIC ADDITIVES Patent Application
William J. Gilwee and Zohar Nir, inventors (to NASA) Filed 12 May 1983 29 p
(NASA-Case-ARC-11427-1; US-Patent-Appl-SN-493865) Avail: NTIS HC A03/MF A01 CSCL 11D

Cured polyfunctional epoxy resins including tris(hydroxyphenyl) methane triglycidyl ether are toughened by addition of polybrominated polymeric additives having an EE below 1500 to the precure composition. Carboxy terminated butadiene-acrylonitrile rubber is optionally present in the precure mixture as such or as a preformed copolymer with other reactants. Reinforced composites, particularly carbon reinforced composites, of these resins are disclosed and shown to have improved toughness. NASA

N83-25792# Hughes Aircraft Co., El Segundo, Calif. Electro-Optical and Data Systems Group.
RESEARCH ON TRANSVERSE REINFORCEMENT OF BOND LINES VIA IN SITU FIBERIZATION Final Report, 26 Mar. 1981 - 15 Jul. 1982
C. H. Sherwood and P. J. Sherman Wright-Patterson AFB, Ohio AFWAL Oct. 1982 78 p refs
(Contract F33615-81-C-5009)
(AD-A123254; HAC-FR-82-76-900; HAC-REF-E8699;
AFWAL-TR-82-4119) Avail: NTIS HC A05/MF A01 CSCL 11/5

The program was to investigate the utility of in situ formed polypropylene fibers as a reinforcement to increase the peel and cleavage performance of adhesively bonded joints. Specifically, phosphoric acid anodized aluminum substrates were used with the aim of producing fibers via flow induced crystallization directly in the pore structure which would extend out into and reinforce the adhesive resin. Experimental results have shown that the in situ formed polypropylene fibers do have dimensions compatible with the pore sizes of the anodic layers produced and there is some evidence to suggest that formation does take place within the pores. Further, it was demonstrated that adhesion to the polypropylene material could be enhanced by plasma treatments; in particular, short time, medium power, oxygen exposures. Bonded T-peel and lap shear specimens were tested and the most promising results for fiberized specimens were in general equal to those obtained with non-fiberized control samples. Author (GRA)

N83-25793# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A PARAMETRIC STUDY OF SURFACE IMPERFECTIONS AND SMALL CUTOUTS IN A COMPOSITE PANEL M.S. Thesis
Thomas C. Janisse Dec. 1982 168 p refs
(AD-A124739; AFIT/GAE/AA/82D-15) Avail: NTIS HC A08/MF A01 CSCL 12/1

A finite element computer code, STAGS C-1, was used to study the effects surface imperfections and cutouts have on the load bearing capability and the displacement patterns of a graphite-epoxy panel. A nonlinear collapse analysis was conducted on two different ply layups each with five different surface imperfection patterns. In addition three different ply orientations were studied each having two different size cutouts (a two inch by two inch square and a four inch by four inch square). The nonlinear branch of STAGS C-1 uses a energy technique using the nonlinear stiffness matrix that was generated by using the Sanders' strain displacement equations. STAGS did a very good job in calculating the collapse load and displacement of a panel with surface imperfections when compared with experimentally tested panel. The collapse characteristics of composite panels are dependent on the ply layup and size of the cutout. Small cutouts had a displacement pattern that was not expected and is

different than the larger cutouts. Changing the vertical boundary conditions on the panel with the small cutout had a negligible effect. GRA

N83-25794# Garrett Turbine Engine Co., Phoenix, Ariz.
CONTACT-STRESS ANALYSIS OF ELASTIC-VISCOELASTIC INTERFACE CONDITIONS Annual Technical Report, Oct. 1981 - Oct. 1982
J. R. Smyth and D. W. Richerson Dec. 1982 50 p refs
(Contract N00014-80-C-0870)
(AD-A124127; Rept-21-4140(1)) Avail: NTIS HC A03/MF A01 CSCL 11/2

The sliding contact (frictional) behavior of Sintered Alpha Silicon Carbide (SASC) was studied over the range of room temperature to 1100 degrees C. Both point- and line-contact configurations were evaluated under low normal forces. The results strongly indicate that a nonelastic mechanism is contributing to the contact behavior of SASC at elevated temperatures. The recovery force appears to be related to the magnitude of the nonelastic contribution. More experimental data is required to develop an analytical model to account for the nonelastic behavior at contact interfaces at elevated temperatures. GRA

N83-25795# Atlantic Research Corp., Alexandria, Va.
COMPOSITE MATERIAL AIRCRAFT ELECTROMAGNETIC PROPERTIES AND DESIGN GUIDELINES
J. A. Birken, W. G. Duff, D. R. Pflug, and R. A. Wallenberg Oct. 1981 369 p refs
(Contract N00019-79-C-0634)
(AD-A124016) Avail: NTIS HC A16/MF A01 CSCL 01/3

This document collects and primarily summarizes aircraft advanced composite material electromagnetic properties, and secondarily, summarizes composite material mechanical, thermal, environmental, fabrication properties noting their ramifications on electromagnetic performance. It, then, overviews the electromagnetic sub-disciplines of threats, external to internal aircraft coupling, component and subsystems susceptibility protective methods as well as test and evaluation of small sample to total aircraft composite material electromagnetic performance. The sub-disciplines constitute a partioned set of independent variables which allow the reader to locate his area of interest in one section of the book. The sub-discipline are then combined to perform total aircraft electromagnetic system performance noting the protective methods, advantages and penalties. Author (GRA)

N83-25796# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A COMPOSITION FOR IGNITION MOTORS
H. Seimixu and H. Marusen 7 Jan. 1983 17 p Transl. into ENGLISH of Japanese Patent no. SHO-56(1981)-109 (31 Aug. 1981) p 493-498
(AD-A123976; FTD-ID(RS)T-1659-82) Avail: NTIS HC A02/MF A01 CSCL 11/4

Improved combustion of solid rocket propellants is obtained by using 52 to 82 wt % ammonium perchlorate as the oxidizer and 7 to 8 wt % boron and 7 to 8 wt % aluminum as the combustion agents. Conventional metallic oxides (iron, copper, chromium, etc.) are used as the combustion catalysts, with small particle diameter ferric oxide (4 to 7 wt %) being preferred. The propellant displays high performance with about 1400 to 1500 cal/g of heat generated, a combustion rate of about 23 to 27 mm/sec, and a pressure index of 0.40 to 0.49. A.R.H.

N83-25797# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering and Mechanics.
ANALYSIS OF LAYERED COMPOSITE PLATES BY THREE-DIMENSIONAL ELASTICITY THEORY Interim Technical Report
J. N. Reddy and T. Kuppusamy Nov. 1982 45 p refs
(Contract N00014-78-C-0647)
(AD-A124036; TR-31; VPI-E-82-31) Avail: NTIS HC A03/MF A01 CSCL 11/4

This report contains two parts: the first part is concerned with the natural vibrations of laminated anisotropic plates, and the second part is concerned with geometrically nonlinear, finite-element analysis of the bending of cross-ply laminated anisotropic composite plates. Individual laminae are assumed to be homogeneous, orthotropic and linearly elastic. A fully three-dimensional isoparametric finite element with eight nodes (i.e., linear element) and 24 degrees of freedom (three displacement components per node) is used to model the laminated plate. The finite element results of the linear analysis are found to agree very well with the exact solutions of cross-ply laminated rectangular plates under sinusoidal loading. Author (GRA)

N83-25798# North Carolina State Univ., Raleigh.
PROPERTIES AND RESIDUAL STRESSES IN ANGLE-PLY POLYMER MATRIX COMPOSITES Final Report, 20 Mar. - 20 Dec. 1979
Abdel Fahmy, Harvey A. West, and Mark A. Elkins Mar. 1982 219 p refs
(Contract DAAG46-79-C-0021)
(AD-A125101; AMMRC-TR-82-12) Avail: NTIS HC A11/MF A01 CSCL 11/4

A series of samples of graphite/epoxy, glass/epoxy, and Kevlar epoxy were prepared. In addition, hybrids of glass epoxy and Kevlar epoxy were laid up in various configurations. The samples were subjected to hygrothermal cycling and properties in the through-the-thickness direction were measured as a function of cycling. Thermal expansion and residual stress measurements were made and the effect of ply orientation was determined on both the hybrid and standard composites. GRA

N83-25799# Washington Univ., St. Louis, Mo.
HYGROTHERMAL EXPANSION OF KEVLAR 49/EPOXY AND S2-GLASS/EPOXY COMPOSITES
S. Y. Lo and H. T. Hahn Nov. 1982 165 p refs
(Contract W-7405-eng-48)
(DE83-006567; UCRL-15517) Avail: NTIS HC A08/MF A01

Ply failure during preconditioning at 750 C of [0/90] sub 2S/S2-glass/epoxy and Kevlar 49/epoxy laminates is discussed. Wet specimens showed different thermal expansion behavior near and above the glass transition temperature. Various available theories can be used to predict the thermal expansion coefficients. Stress analysis showed that the compressive normal stress at the interface in Kevlar 49/epoxy after cure is very small compared with those in other composites. Significant and rapid changes in the transverse coefficient of thermal expansion occurs in the T sub g region. The two-phase diffusion model is a good representation of the diffusion behavior. Desorption process reveals a higher diffusion coefficient than absorption. S2-glass/epoxy was found to be unstable under the conditions applied, with cracking and losses during desorption. Maximum moisture contents were approx. 0.31% at 750C/75% RH and approx. 0.412% at 750C/water. The composite swelled transversely up to about 0.11 and 0.16%. DOE

N83-25800# Sandia Labs., Albuquerque, N. Mex.
HIGH-TEMPERATURE ELECTRICAL CONDUCTIVITY AND THERMAL DECOMPOSITION OF SYLGARD 184 AND 184/GMB
Ralph T Johnson, Jr. and Robert M. Biefeld Jan. 1983 50 p refs
(Contract DE-AC04-76DP-00789)
(DE83-005810; SAND-82-1283) Avail: NTIS HC A03/MF A01

These properties were determined to 600 to 7000 C in air and nitrogen environments. The material is a silicone-based dielectric and is used as an encapsulant for electronic components. The 184/GMB material contains glass microballoons. The thermal decomposition characteristics were determined from ass loss and vaporization species (mass spectroscopy) measurements. Results show only minor weight loss in air up to 3000 C and in nitrogen to 4000 C. There is a peak in the conductivity at approx. 3000 C which results from the volatilization of [Si (CH3)]/sub n/ with some dehydration. At and above 4000 C, weight loss is much more pronounced and the conductivity is dependent upon the atmosphere and upon the presence of glass microballoons. The conductivity characteristics in air are similar to those in nitrogen,

except there is a peak in air at 490 to 5300 C due to combustion and there is a shift to lower temperatures. This indicates that the oxygen accelerates decomposition. 184/GMB exhibits an enhanced conductivity above approx. 5000 C. DOE

N83-25801# Sandia Labs., Albuquerque, N. Mex.
THE DARPA DYNAMIC SYNTHESIS PROGRAM: SANDIA NATIONAL LABORATORIES' PROGRAM ON SHOCK-ACTIVATED SINTERING Quarterly Report
R. A. Graham, E. K. Beauchamp, B. Morosin, E. L. Venturini, and D. M. Webb 31 Dec. 1982 93 p refs
(Contract DE-AC04-76DP-00789)
(DE83-006809; DOE/NEM-3006809; QR-2) Avail: NTIS HC A05/MF A01

The progress on shock-activated sintering of inorganic powders TiC, TiB2, AlN and Al2O3 are described. Recovery fixture development, numerical simulation of shock conditions imposed in explosive shock modification experiments, characterization of shock-modified powders, and powder consolidation studies are described. DOE

N83-25802# Washington Univ., Seattle. Dept. of Mining and Metallurgical and Ceramic Engineering.
EXPLORATORY RESEARCH ON SILICON NITRIDE COMPOSITES Final Report
D. B. Fischbach and D. McLaren 25 Jun. 1982 27 p refs
(Contract DE-FG01-78ET-13389)
(DE82-017286; DOE/ET-13389/T1) Avail: NTIS HC A03/MF A01

Possibilities of making silicon nitride composites, reinforced with various ceramic fibers, by reaction bonding of particulate silicon matrices were explored with the objective of increasing material toughness. Two fabrication methods were developed using low volume fractions of fibers: lamination of CVD filaments between thin foils of polymer-bonded silicon; and casting of composites containing continuous or chopped fine fibers or filaments with aqueous or non-aqueous silicon slips. Further work is required to increase matrix density, optimize fiber/matrix bonding and increase fiber volume fraction. Both high modulus chemical vapor deposited silicon carbide filaments and low modulus boron nitride fine fibers were found to be compatible with reaction bonding processing. Poor matrix bonding resulted with fine silicon carbide fibers made from a polycarbosilane polymer precursor, because of a surface degradation reaction. DOE

N83-25803# Los Alamos Scientific Lab., N. Mex.
SPARK-EROSION CHARACTERISTICS OF GRAPHITE AND CO GAS
K. J. Bickford, K. W. Hanks, and W. L. Willis 1982 9 p refs Presented at the 15th Power Modulator Symp., Baltimore, 14-16 Jun. 1982
(Contract W-7405-eng-36)
(DE82-018356; LA-UR-82-1606; CONF-820626-5) Avail: NTIS HC A02/MF A01

The spark erosion characteristic of high-purity graphite and CO for 1-kHz gas blown rail-gap applications was experimentally evaluated. The test configuration simulates a single channel, 1650-A arc discharge per linear inch of electrode length, with a 44-kV self-breakdown voltage and a transverse gas flow of 98 m/s. The dielectric gas was seeded with a small quantity of azulene vapor and a downstream uv preionization spark was used to assist the self-breakdown of the test electrodes. The erosion characteristics of other, more conventional electrode materials and dielectric gases were also examined and the results are presented graphically. Commercially pure tunsten in air was determined to exhibit the least erosion rate (.0000021 for this duty, as compared to graphite and CO (.0000075 cc/C). DOE

N83-25804# California Univ., Livermore. Lawrence Livermore Lab.
TECHNIQUE FOR FABRICATING THICK POLYMIDE COATINGS IN THE 10 TO 100 MU RANGE
W. C. Herrmann 14 May 1982 20 p refs
(Contract W-7405-eng-48)
(DE82-015595; UCID-19396) Avail: NTIS HC A02/MF A01

A multicoating planar polyimide coating technique was developed which covers a preselected thickness range between 10 and 100 micrometers, over a 1 cm diameter. Excellent surface qualities plus low submicron particulate levels contribute to achieving high resolution images (2 to 3 micrometer range) with the aid of photoresist coatings and contact exposures. Reactive ion etching of polyimide maintains this resolution and produces the vertical geometry required for the fabrication step of thick Au Zone Plates. DOE

N83-25805# California Univ., Livermore. Lawrence Livermore Lab.
MECHANICAL PROPERTIES OF COMPOSITE MATERIALS
R. M. Christensen 14 May 1982 18 p refs Presented at IUTAM Symp. on Mech. of Composite Mater., Blacksburg, Va., 16 Aug. 1982
(Contract W-7405-eng-48)
(DE82-015509; UCRL-87570; CONF-820823-1) Avail: NTIS HC A02/MF A01

The means of predicting the mechanical properties of composite materials in terms of the microstructure properties are assessed. Fiber reinforced composites are considered as well as other types of heterogeneous combinations of materials. Various geometric models of microstructure characteristics are discussed. Primary emphasis is given to elasticity results, although some viscoelasticity and plasticity formulations are considered. DOE

N83-25806# Washington Univ., St. Louis, Mo. Lab. for Materials Research.
MECHANICAL PROPERTIES OF A FILAMENT-WOUND ARAMID FIBER/EPOXY COMPOSITE FOR FLYWHEEL APPLICATION
H. Thomas Hahn and W. K. Chin Feb. 1982 126 p refs
(Contract W-7405-eng-48)
(DE82-015845; UCRL-15461) Avail: NTIS HC A07/MF A01

The purpose of this program was to determine the mechanical properties of a filament-wound Kevlar 49/epoxy composite in a preconditioned in the test environent (75 C and 1 Pa) for periods of 1 to 5 months before mechanical tests. The simulated service environment of 75 C in vacuum had little effect on static and fatigue properties of the composite. The excellent retention of strength by individual fibers in the same environment provides added confidence. The composite is stable for a period of two years studied so far in the 75 C/vacuum environment; however, the moisture desorption increases residual stresses and causes ply cracking in laminates. The composite is less sensitive to the environment than the fibers and the matrix by themselves. DOE

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N83-25807 Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
MAGNETIC FIELD EFFECTS ON SOLUTE REDISTRIBUTION IN VERTICAL NORMAL FREEZING WITH STABILIZING THERMAL GRADIENTS M.S. Thesis
Hamlet Herring, III Jun. 1983 64 p refs
Copyright. Avail: NTIS HC A04/MF A01

An investigation into the effects of a transverse magnetic field on solute segregation during crystal growth was enacted to establish a qualitative understanding of magnetic viscosity effects on convection. Solute redistribution was compared in crystal grown in both the absence and presence of a magnetic field. Longitudinal segregation profiles and solute striations were used as a key to evaluating differences in convective flow caused by the presence

of the 2.9 Kgauss field. Results indicate that a magnetic viscosity did reduce the fluid flow velocity of the melt. A forced mixing effect caused by current pulsing during magnetic field growth was also detected. Author

N83-25808*# Massachusetts Inst. of Tech., Cambridge.
EFFECT OF FLUID FLOW ON ZINC ELECTRODEPOSITS FROM ACID CHLORIDE ELECTROLYTES M.S. Thesis
Antoine Anwar Abdelmassir Feb. 1982 66 p refs
(Grant NsG-7645)
(NASA-CR-172626; NAS 1.26:172626) Avail: NTIS HC A04/MF A01 CSCL 07D

Zinc was deposited potentiostatically from acid chloride baths. Once bath chemistry and electrochemistry were controlled, the study was focused on convective mass transfer at horizontal electrodes and its effect on cell performance. A laser schlieren imaging technique allowed in situ observations of flow patterns and their correlation with current transients. Convection was turbulent and mass transfer as a function of Rayleigh number was well correlated by: Sh = 0.14 R to the 1/3 power. Similarly, convection initiation time was correlated by DT/d squared = 38 Ra to the -2/3 power. Time scale of fluctuations was about hhalf the initiation time. Taking the boundary layer thickness as a characteristic length, a critical Rayleigh number for the onset of convection was deduced: Ra sub CR = 5000. Placing the anode on the top of the cathode completely changed the flow pattern but kept the I-t curves identical whereas the use of a cathode grid doubled the limiting current. A well defined plateau in the current voltage curves suggested that hydrogen evolution has been successfully inhibited. Finally, long time deposition showed that convection at horizontal electrodes increased the induction time for dentrite growth by at least a factor of 2 with respect to a vertical wire. Author

N83-25809*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ECUT: ENERGY CONVERSION AND UTILIZATION TECHNOLOGIES PROGRAM BIOCATALYSIS RESEARCH ACTIVITY. POTENTIAL MEMBRANE APPLICATIONS TO BIOCATALYZED PROCESSES: ASSESSMENT OF CONCENTRATION POLARIZATION AND MEMBRANE FOULING
J. D. Ingham Feb. 1983 24 p refs
(Contract DE-AI01-8ACS-66001)
(NASA-CR-172650; JPL-Publ-83-6; NAS 1.26:172650) Avail: NTIS HC A02/MF A01 CSCL 07D

Separation and purification of the products of biocatalyzed fermentation processes, such as ethanol or butanol, consumes most of the process energy required. Since membrane systems require substantially less energy for separation than most alternatives (e.g., distillation) they have been suggested for separation or concentration of fermentation products. This report is a review of the effects of concentration polarization and membrane fouling for the principal membrane processes: microfiltration, ultrafiltration, reverse osmosis, and electrodialysis including a discussion of potential problems relevant to separation of fermentation products. It was concluded that advanced membrane systems may result in significantly decreased energy consumption. However, because of the need to separate large amounts of water from much smaller amounts of product that may be more volatile than wate, it is not clear that membrane separations will necessarily be more efficient than alternative processes. Author

N83-25810*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ECUT: ENERGY CONVERSION AND UTILIZATION TECHNOLOGIES PROGRAM BIOCATALYSIS RESEARCH ACTIVITY. GENERATION OF CHEMICAL INTERMEDIATES BY CATALYTIC OXIDATIVE DECARBOXYLATION OF DILUTE ORGANIC ACIDS
S. DiStefano, A. Gupta, and J. D. Ingham Mar. 1983 23 p refs
(Contract DE-AI01-81CS-66001)
(NASA-CR-172649; JPL-Publ-83-19; NAS 1.26:172649) Avail: NTIS HC A02/MF A01 CSCL 07D

A rhodium-based catalyst was prepared and preliminary experiments were completed where the catalyst appeared to decarboxylate dilute acids at concentrations of 1 to 10 vol%. Electron spin resonance spectroscoy was used to characterize the catalyst as a first step leading toward modeling and optimization of rhodium catalysts. Also, a hybrid chemical/biological process for the production of hydrocarbons has been assessed. These types of catalysts could greatly increase energy efficiency of this process. Author

N83-25811*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
PROCESS FOR PRODUCING TRIS (N-METHYLAMINO) METHYLSILANE Patent Application
Johnny M. Clemons, Benjamin G. Penn, and Frank E. Ledbetter, inventors (to NASA) Filed 9 May 1983 12 p
(NASA-Case-MFS-25721-1; US-Patent-Appl-SN-492963) Avail: NTIS HC A02/MF A01 CSCL 07D

A method of producing tris (N-methylamine) methylsilane, including the steps of forming and cooling a liquid solution of methylamine in an inert solvent and under an inert atmosphere at a temperature of about -30 C and slowly adding a quantity of methyltrichlorosilane while maintaining said temperature. The reaction mixture is then heated for about 60 minutes at a temperature of about 40 C, followed by filtering the solid portion from the liquid portion. The liquid is distilled to remove the solvent, resulting in a high yield of tris (N-methylamine) methylsilane. NASA

N83-25812# Royal Aircraft Establishment, Farnborough (England).
SOME PROBLEMS OF THE ELECTRO-RHEOLOGY OF DISPERSED SYSTEMS
Yu. F. Deinega Sep. 1982 13 p refs Transl. into ENGLISH from Masliny i Tekhnol. Pererab. Kauchukov Polimery i Rezinov Smesei (USSR), no. 1, 1978 p 29-36
(RAE-Trans-2092; BR87703) Avail: NTIS HC A02/MF A01

Electrical methods have formed the classical basis for the investigation of the structure of dispersed systems for more than 100 years. Their precise value is difficult to assess but it is probably sufficient to recall the role played by electrical methods in the formation of the contemporary representatives of dispersed systems. The main thrust of these investigations was directed towards aqueous systems with non-aqueous system receiving scant attention. Recently the situation has changed noticeably with an ever increasing interest into the electrical properties of non-aqueous, particularly hydrocarbon, dispersed systems. This is linked directly to the discovery of new phenomena in such systems together with the possibility of practical applications. Author

N83-25813*# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
CHEMORHEOLOGY OF REACTIVE SYSTEMS: FINITE ELEMENT ANALYSIS
Craig Douglas and David Roylance Sep. 1982 23 p refs Sponsored in part by NASA, Army, and Hysol-Dexter Corp.
(NASA-CR-172628; NAS 1.26:172628) Avail: NTIS HC A02/MF A01 CSCL 07D

The equations which govern the nonisothermal flow of reactive fluids are outlined, and the means by which finite element analysis is used to solve these equations for the sort of arbitrary boundary conditions encountered in industrial practice are described. The performance of the computer code is illustrated by several trial problems, selected more for their value in providing insight to polymer processing flows than as practical production problems. Although a good deal remains to be learned as to the performance and proper use of this numerical technique, it is undeniably useful in providing better understanding of today's complicated polymer processing problems. Author

N83-25814# Washington Univ., Seattle. Dept. of Chemistry.
VIBRATIONAL ENERGY TRANSFER AT A GOLD SURFACE IN REACTING SYSTEMS: CYCLOBUTENE AND NITROMETHANE
Wei Yuan and B. S. Rabinovitch 1 Dec. 1982 30 p refs

(Contract N00014-75-C-0690)
(AD-A123275; NR092-549-TR26) Avail: NTIS HC A03/MF A01 CSCL 07/4

Single collision vibrational excitation probabilities are measured on treated polycrystalline gold plane and wire surfaces. For cyclobutene, strong collider behavior obtains below 600 K. The energy transfer efficiency is greater than that on a seasoned silica surface. The energy transfer efficiency declined above 600 K to a quasi-constant value in the range 900 K - 1150 K. This may be evidence for surface mobility. Unlike cyclobutene, and earlier studies of nitromethane on silica surfaces where reproducible non-catalytic behavior could be attained, nitromethane on gold showed apparent surface sensitivity which the various conditioning treatments failed to repress. Author (GRA)

N83-25815# Naval Research Lab., Washington, D. C. Surface Chemistry Branch.
THE REACTION OF OXYGEN-NITROGEN MIXTURES WITH GRANULAR ACTIVATED CARBONS BELOW THE SPONTANEOUS IGNITION TEMPERATURE
Victor R. Deitz 14 Jan. 1983 31 p refs
(AD-A123238; NRL-MR-4973) Avail: NTIS HC A03/MF A01 CSCL 07/3

The formation of carbon monoxide and carbon dioxide was followed in the reaction of oxygen-nitrogen mixtures with granular carbons in flow systems. The results may be divided into three categories: (1) In the temperature range 50-200 degrees C, there is anomalous desorption with the formation of a number of maxima in the concentrations of CO and CO2, (2) a higher temperature range in which there is a steady decay of CO and CO2 concentration with first order rate constants observed at constant temperature, and (3) the attainment of a spontaneous ignition temperature (SIT) with good reproducibility. A model is proposed in which a surface carbon-oxygen network of some complexity exists as a barrier to further oxidation. The complex decomposes progressively with increase in temperature with CO and CO2 as end products. When the decomposition of the complex exceeds the rate of formation, the barrier is penetrated and the oxygen can then enter the bulk carbon where unrestricted can take place. This occurs above the SIT. Author (GRA)

N83-25816# Pennsylvania State Univ., University Park. Applied Research Lab.
THE CHEMICAL BEHAVIOR OF THE ALKALI METAL ACETYLENEDIOLATES Ph.D. Thesis
Charles Kenneth Taylor 27 Oct. 1982 227 p refs
(Contract N00024-79-C-6043)
(AD-A123246; ARL/PSU/TM-82-216) Avail: NTIS HC A11/MF A01 CSCL 07/2

This thesis outlines the observed chemical behavior of potassium acetylenediolate (K2C202). Also within this thesis is a review of the properties and known reactions of the group IA alkali metal acetylenediolates. Potassium acetylenediolate is produced by the one electron reduction of carbon monoxide effected by metallic potassium solvated in liquid ammonia at -50 degrees. This material is a pale yellow powder which burns explosively upon contact with the atmosphere. It also reacts violently with halogens, halogenated hydrocarbons, alcohols, water, and any substance which possesses an acidic hydrogen. Author (GRA)

N83-25817# TRW, Inc., Redondo Beach, Calif. Engineering Sciences Lab.
WALL EFFECTS ON COMBUSTION IN AN ENGINE Final Report, 15 Sep. 1977 - 14 Feb. 1983
Francis E. Fendell Feb. 1983 8 p
(Contract DAAG29-77-C-0032)
(AD-A124431; ARO-15048.10-EG) Avail: NTIS HC A02/MF A01 CSCL 21/7

Basic studies of the interaction of a premixed hydrocarbon/air flame with a planar wall have been carried out; these studies were motivated by a reciprocating-piston-engine combustion. The principal experimental methodology was probing of burner-stabilized flames by laser Raman spectroscopy, while the theoretical methodology combined limit-process expansions exploiting large activation energy and numerical integration. The engineering implications of these fundamental studies are now summarized. First, investigations to elucidate the source of unburned hydrocarbon emissions indicated that quenching of a propagating flame near a cold (conventional metallic-alloy) wall was primarily owing to thermal effects (as opposed to radical absorption and recombination); however, quench-layer contents persisting near a single cold wall after the combustion event are oxidated before blowdown. Author (GRA)

N83-25818# California Univ., Santa Barbara. Dept. of Physics.
ESTERS DISSOCIATIVELY ADSORB ON ALUMINA
A. Bayman, P. K. Hansma, and L. H. Gale Feb. 1983 24 p refs
(Contract N00014-78-C-0011)
(AD-A124457; TR-12) Avail: NTIS HC A02/MF A01 CSCL 07/3

Inelastic electron tunneling spectra for esters of the form RCOOR' show that these compounds dissociate on alumina and only the RCOO ion bonds to the surface. For phenethyl benzoate, ethyl-d5 benozate, benzyl-d7 benzoate, the benzoate ion is symmetrically adsorbed. For ethyl-d5 acetate, the spectrum is distinguishable from the spectrum of a symmetrically bonded acetate ion. Author (GRA)

N83-25819# California Univ., Santa Barbara. Dept. of Physics.
TUNNELING SPECTROSCOPY AS A PROBE OF ADSORBATE-SURFACE INTERACTION
Paul K. Hansma Feb. 1983 15 p refs Presented at the 3rd Intern. Conf. on Vibrations at Surfaces, Pacific Grove, Calif., 1-4 Sep. 1982
(Contract N00014-78-C-0011; Grant NSF DMR-79-25430)
(AD-A124453; TR-14) Avail: NTIS HC A02/MF A01 CSCL 07/4

Tunneling spectroscopy is a sensitive probe of two classes of adsorbate-surface interactions: interactions of the adsorbate with the substrate on which it is adsorbed and adsorbate interactions with the top metal electrode that is evaporated on top of it. In general, the interaction of the adsorbed molecules with the top metal electrode produces a down-shift in the vibrational mode position ranging in size from < or approximately 0.1% to < or approximately 10% depending on the dipole derivative of the mode and the type of top metal electrode. GRA

N83-25820# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A CRYOGENIC ARGON IONIZATION CHAMBER DETECTOR FOR ANALYSIS OF RADIOACTIVE NOBLE GASES M.S. Thesis
Stephen Rolph Berggren Mar. 1982 76 p refs
(AD-A124736; AFIT/GNE/PH/82-3) Avail: NTIS HC A05/MF A01 CSCL 18/2

Two ionization chamber detectors, using liquid or solid argon as their medium were designed, constructed and tested as an improved means of analyzing quantitatively xenon 131m and xenon 133. Problems with the first detector, including vibrational noise and inadequate temperature control, limited its use to studies using solid argon. In the second design, many operating problems of the first detector were corrected. Properties of the detectors were studied using external gamma sources and xenon 131m dispersed inside the detector medium. The xenon sample and argon were purified and cryogenically pumped into the detector for spectral analysis. Both the purity of the argon and bias voltages affected resolution by changing the trapping distance of the electrons in the medium. Lower temperatures increased detection efficiency by condensing more of the sample into the cell. No clearly recognizable energy peak could be found in spectra from external or internal sources. GRA

N83-25821# Thiokol Corp., Huntsville, Ala. Propellant Development Branch.
BONDLINE INFRARED SPECTROSCOPY (BIS) Final Report,

1 Sep. 1980 - 30 Nov. 1982
W. W. Schwarz, R. J. Schorr, W. I. Dale, Jr., and J. W. Blanks Edwards AFB, Calif. AFRPL Jan. 1983 230 p refs
(Contract F04611-80-C-0034; AF Proj. 5730)
(AD-A124728; AFRPL-TR-82-92; U-82-14B) Avail: NTIS HC A11/MF A01 CSCL 07/4

Laboratory procedures for making the IR spectrum of propellant, liner, and insulation were established. Samples of an HTPB propellant bond system and a minimum smoke propellant bond system were aged for 32 weeks at up to 165 F. Changes in the absorption (peak height) of certain IR wave lengths in the spectra of the binders of the propellants, liners, and insulations were correlated to changes in the strengths of the bond between the various substrates. Computer programs were written to perform the IR data reduction, correlate the changes taking place in IR absorption and bond strength, compute reaction rate constants, reaction activation energy and predict bond strengths at some future times at selected temperatures. Author (GRA)

N83-25822# Naval Academy, Annapolis, Md. Dept. of Chemistry.
THE SYNTHESIS OF POTENTIALLY CATALYTIC BIMETALLIC SYSTEMS Final Report, 1981 - 1982
Michael J. Golightly 29 Nov. 1982 60 p refs
(AD-A124405; USNA-TSPR-116) Avail: NTIS HC A04/MF A01 CSCL 07/2

Work this year has focused on the development of a synthetic sequence to the double metal system shown in Figure XIV which incorporates ferrocene as the backbone of the molecule. Such systems have the potential for hydrogen evolution from acidic solutions. A route to the synthesis of 1'-benzylferrocenecarbinol (XIII), involving the diketone intermediate 1-benzoyl-1'-o-chlorobenzoyl-ferrocene (XXIII) is discussed. XIII is used to synthesize the novel double metal compounds 1'-benzylferrocenecarbinol chromium tricarbonyl (XXIX,M=Cr) and 1-methylenediphenylphosphite-1'-benzylferrocene chromium tricarbonyl (XXX,M=Cr). An analogous compound, benzylferrocene chromium (XXX,M=Cr) triphenylphosphine dicarbonyl (XXXIII) was also prepared. Author (GRA)

N83-25823# Wisconsin Univ., Madison. Dept. of Metallurgical and Mineral Engineering.
STUDIES OF ADATOM-ADATOM INTERACTIONS IN CHEMISORBED LAYERS Final Report
M. G. Lagally 30 Dec. 1982 12 p refs
(Contract N00014-76-C-0727; NR Proj. 322-072)
(AD-A123734) Avail: NTIS HC A02/MF A01 CSCL 07/4

Phase transitions in adsorbed layers have been studied both theoretically and experimentally, using low-energy electron diffraction (LEED) as the major technique. The model system O/W(110) was studied and its phase diagram determined. In particular, it was shown that a two-phase coexistence region must always exist if there is a net overlayer cohesive energy. The details of this coexistence region were investigated, including the influence of finite-size effects in the overlayer on the phase transition.
Author (GRA)

N83-25824# Naval Postgraduate School, Monterey, Calif. Dept. of Mechanical Engineering.
TESTING OF A SHROUDED, SHORT MIXING STACK GAS EDUCTOR MODEL USING HIGH TEMPERATURE PRIMARY FLOW M.S. Thesis
Ira James Eick Oct. 1982 239 p refs
(AD-A123776) Avail: NTIS HC A11/MF A01 CSCL 21/2

An existing apparatus for testing models of gas eductor systems using high temperature primary flow was redesigned and modified to provide improved control and performance over a wide range of gas temperatures and flow rates. Pumping coefficient, temperature, and pressure data were recorded for two gas eductor system models. The first, previously tested under hot flow conditions, consisted of a primary plate with four straight nozzles and a slotted, shrouded mixing stack with wo ring diffuser (L/D=2.5). The second was geometrically similar to a model previously tested in cold flow. This model employed a primary plate with four tilted angled nozzles and a slotted, shrouded mixing stack with two ring diffuser (L/D=1.5). Thermal imagery was used to generalize the data obtained by direct temperature measurement. The validity of cold flow model testing is confirmed. The short stack with tilted angled primary nozzles is shown to have superior mixing and pumping performance, but to exhibit significantly higher shroud and diffuser surface temperatures. GRA

N83-25825# Royal Aircraft Establishment, Farnborough (England).
STRUCTURE FORMATION OF ELECTRO-RHEOLOGICAL SUSPENSIONS IN AN ELECTRIC FIELD. PART 2: QUANTITATIVE EVALUATIONS
Z. P. Shulman, B. M. Khusid, and A. D. Matsepuro Jun. 1982 11 p refs Transl. into ENGLISH from Vestsi Akad. Nauk Belaruskai SSR (USSR), no. 3, 1977 p 122-127
(AD-A124004; DRIC-BR-86201; RAE-LIBRARY-TRANS-2089) Avail: NTIS HC A02/MF A01 CSCL 07/4

On the basis of a model of an interelectrode bridge which stretches with the motion of one of the electrodes, the calculation of an increment of the shear stress in the Couette flow for an electro-rheological suspension with an applied electrical field normal to the shear planes was carried out. The calculated results are compared with experimental data. R.J.F.

N83-25826# Southwest Research Inst., San Antonio, Tex. Energy Systems Research Div.
MECHANISMS OF SMOKE REDUCTION IN THE HIGH-PRESSURE COMBUSTION OF EMULSIFIED FUELS. VOLUME 2: EXPERIMENTAL AND THEORETICAL STUDY OF EVAPORATING EMULSIFIED AND NEAT FUEL SPRAYS Annual Progress Report, 29 Sep. 1980 - 29 Sep. 1981
Lee G. Dodge and Clifford A. Moses Dec. 1982 77 p refs
(Contract N00014-80-K-0460)
(AD-A124046; SWR-6287/2; APR-2) Avail: NTIS HC A05/MF A01 CSCL 21/2

This report documents progress made during the second year of a three-year study of the atomization and evaporation characteristics of emulsified and alternative fuels at conditions typical of those found in gas turbine engines. The development of experimental techniques suitable for drop size measurements in realistic polydisperse fuel sprays in high pressure/temperature air has been the first goal of this year's program. The second area of interest has been the development of detailed drop models which predict the heat-up, evaporation, and trajectory of fuel sprays and the resulting size distribution parameters. In addition to these two areas, a facility was constructed during the first year of this program to allow for the containment of sprays in high pressure/temperature moving air with optical access for spray size measurements. These experimental and analytical tools have and will continue to be used to study the differences in atomization/evaporation of emulsified and neat fuels, and various other fuels at interest to the U.S. Navy. GRA

N83-25827# Naval Research Lab., Washington, D. C. Inorganic and Electrochemistry Branch.
ELECTRODEPOSITION OF REFRACTORY CARBIDE COATINGS Interim Report
K. H. Stern 30 Dec. 1982 15 p refs
(SF43400391)
(AD-A123868; AD-E000522; NRL-MR-4995) Avail: NTIS HC A02/MF A01 CSCL 07/1

A novel method for electrodepositing refractory carbide coatings from molten salts is described. It consists of the simultaneous reduction of the appropriate metal species dissolved in the ternary LiF-NaF-KF eutectic and carbonate dissolved in the same melt. The metal and carbon deposit on the cathode where they react to form the carbide. The coatings are hard, abrasion resistant, and resist oxidation in air to 500 C. Carbides of tantalum and tungsten have been plated so far, and the method is applicable to other carbides as well. GRA

N83-25828# Naval Surface Weapons Center, White Oak, Md. Research and Technology Dept.
THERMOGRAVIMETRIC ANALYSIS OF SILVER OXIDE MIXTURES
W. A. Parkhurst, S. Dallek, and B. F. Larrick Aug. 1982 30 p refs
(AD-A123881; AD-F500115; NSWC/TR-82-420) Avail: NTIS HC A03/MF A01 CSCL 07/2

A method has been developed for the analysis of silver-silver oxide mixtures specifically as they occur in silver oxide cathode material. The method is based on thermogravimetric analysis (TGA) and is useful in determining the Ag0, Ag sub 2 0, and Ag composition of a variety of cathode materials. The method has been compared with the Wagner chemical titration method currently used for silver oxide cathode analysis. The precision of the TGA method has been proven; however, further work is necessary to determine its accuracy. GRA

N83-25829# Naval Postgraduate School, Monterey, Calif. Dept. of Aeronautics.
AUTOMATIC CONTROL AND DATA ACQUISITION SYSTEM FOR COMBUSTION LABORATORY APPLICATIONS M.S Thesis
Bertel J. Hansen Oct. 1982 120 p refs
(AD-A125195) Avail: NTIS HC A06/MF A01 CSCL 21/2

A modern computer based automatic data acquisition/control system was installed at the Department of Aeronautics' Combustion Laboratory. This system utilizes an HP-85 desktop computer as system controller for the HP-3054A data acquisition system. Large quantities of high quality data can be acquired at high data rates and stored for future use or processed real time in closed loop feedback control circuits for precise process control and display. Other electromechanical equipment such as Visicorders provide analog real time data and run in parallel with digital equipment but can be remotely controlled for precise timing of experiments. Interactive programs on the HP-85 computer allow the experimenter to do preliminary calculations, initial experiment set-up, and to perform accurate process control of system functions. On line data reduction and display of results is performed by the system CRT display, the 7225B Plotter, or the system printer. Four basic experiments/experimental apparatuses are currently automated using the automatic data acquisition system; a light scattering experiment, a vitiated air heater, a solid fuel ramjet, and a turbojet combustor test rig. The first three applications are discussed in subsequent sections along with the measurement techniques used to implement the process. Author (GRA)

N83-25830# Pennsylvania State Univ., University Park. Applied Research Lab.
TEMPERATURE AND PARTICLE SIZE DEPENDENCE OF SODIUM BICARBONATE INHIBITION OF METHANE/AIR FLAMES M.S. Thesis
Hyung T. Kim 3 Nov. 1982 88 p refs
(Contract N00024-79-C-6043)
(AD-A125105; ARL/PSU/TM-82-235) Avail: NTIS HC A05/MF A01 CSCL 20/2

Coal mining/handling operations, as well as those of other powder-using industries, are occasionally interrupted by explosions and fires as a consequence of uncontrolled, fugitive flammable dusts. Damage to life and loss of capital are the unsatisfactory results. Hence, the development of powerful fire extinguishing/suppressing agents to stop these holocausts has become an increasingly important scientific challenge in today's energy and safety conscious world. Author (GRA)

N83-25831# California Univ., Santa Barbara. Quantum Inst.
INELASTIC ELECTRON TUNNELING SPECTROSCOPIC STUDY OF ACETYLENE CHEMISORBED ON LUMINA SUPPORTED PALLADIUM PARTICLES
A. Bayman, P. K. Hamsma, W. C. Kaska, and L. H. Dubois Feb. 1983 30 p refs Submitted for publication Prepared in cooperation with Bell Telephone Labs., Inc., Murray Hills, N.J.
(Contract N00014-78-C-0011; NR Proj. 056-673)
(AD-A125028; TR-13) Avail: NTIS HC A03/MF A01 CSCL 07/4

Inelastic electron tunneling spectroscopy was used to study the adsorption of acetylene on palladium particles supported by alumina. Low peak intensities in the spectra complicated the analysis of the multiple species present. Nevertheless, some species could be tentatively identified including weakly bonded acetylene, two types of strongly bonded acetylenic species and two other further rehybridized species. The prospect for the future application of tunneling spectroscopy to the study of other hydrocarbons adsorbed on model supported metal catalysts is discussed. Author (GRA)

N83-25832# Acurex Waste Technologies, Inc., Mountain View, Calif.
FEASIBILITY STUDY OF CHEMICAL DETOXIFICATION OF POLYCHLORINATED BIPHENYL CAPACITORS, PHASE 1 STUDY Final Report
G. Mille and L. Weitzman Jun. 1982 87 p refs Sponsored by EPRI
(EPRI Proj. 1263-7)
(DE82-906427; EPRI-CS-2477) Avail: NTIS HC A05/MF A01

Chemical detoxification of polychlorinated biphenyl (PCB) using sodium metal reduction is emerging as a significant new study on chemical detoxification as it applies to PCB's in capacitors are reported. The results of the first phase of a two-phase study are presented to evaluate the possibility of chemical processing of PCB capacitors. Phase 1 consists of the following tasks: literature search, acquisition of EPA permits for PCB research, evaluation of the legal and regulatory requirements of this process, design specialized equipment for handling PCB capacitors in the laboratory, and design Phase 2 research program. Phase 2 tasks are described. DOE

N83-25833# Bendix Corp., Kansas City, Mo.
COEFFICIENT OF THERMAL EXPANSION OF FLUORINERT AS A FUNCTION OF VOLUME PERCENT ABSORBED AIR
J. M. Reilly Jun. 1982 16 p
(Contract DE-AC04-76DP-00613)
(DE82-016998; BDX-613-2798) Avail: NTIS HC A02/MF A01

The relationship between the coefficient of volumetric thermal expansion of liquid Fluorinert FC-86 and the volume percent of absorbed air was examined experimentally. A special test apparatus was built for this purpose. A floating liquid seal was used to isolate the Fluorinert sample from the atmosphere. This prevented gas absorption during thermal cycling yet allowed the sample to expand and contract freely during testing. It was found that the coefficient of thermal expansion is not influenced by the percentage of absorbed air. DOE

N83-25834# Sandia Labs., Albuquerque, N. Mex.
THICK BORIDE COATINGS BY CHEMICAL VAPOR DEPOSITION
H. O. Pierson and A. W. Mullendore 1982 13 p refs Presented at the Met. Coatings and Process Technol. Conf., San Diego, Calif., 4 Apr. 1982
(Contract DE-AC04-76DP-00789)
(DE82-015412; SAND-81-2454C; CONF-820412-4) Avail: NTIS HC A02/MF A01

An experimental study of the chemical vapor deposition (CVD) of TiB2 by the hydrogen reduction of TiCl4 and BCl3 with the purpose of obtaining very thick (> 100 microns) and uniform coatings. The optimum deposition conditions were: temperature 900 to 950 deg source gas ratios: Ti/B = 1/2 and H/Cl = 6/1. With these conditions, deposition rates greater than 25 microns hour were obtained. Composition was very uniform with excess boron over stoichiometry (probably in the form of free boron). A small amount of chlorine remained incorporated in the deposit probably as TiCl2 (0.05 w/o at. 950 C). The coatings were very hard (approximately 3700 kg/sq mm) and hardness was uniform through the thickness. With careful control of the deposition parameters, the CVD of uniform coatings with thickness > 1 mm appears feasible. DOE

N83-25835# Zenz (Frederick A.), Garrison, N.Y.
STATE-OF-THE-ART REVIEW AND REPORT ON CRITICAL ASPECTS AND SCALE-UP CONSIDERATIONS IN THE DESIGN OF FLUIDIZED-BED REACTORS, PHASE 2 Final Report
1982 214 p refs
(Contract DE-AC21-80MC-14141)
(DE83-003632; DOE/MC-14141/1304) Avail: NTIS HC A10/MF A01

This paper reviews correlations involving the entrainment behavior of particles, such as catalysts, in fluidized bed reactors, in particular the dependence on particle size, density, concentration, gas velocity, density, etc. Some of the published correlations are criticized as obviously failing in certain situations. The author makes an analogy of a liquid boiling and ejecting droplets from the surface which either fall back or finally gradually evaporate and rise and buildings his theory on this behavior. The paper includes a discussion of bubbling fluidized beds and circulation of solid particles in such beds. The paper reviews a considerable amount of experimental data. DOE

N83-25836# Mount Holyoke Coll., South Hadley, Mass.
STUDIES OF THE PHOTOELECTROCHEMISTRY OF ORGANIC DYES USING ATTENUATED TOTAL-REFLECTION TECHNIQUES Annual Progress Report, 1 Jun. 1982 - 31 May 1983
M. T. Spitler Jan. 1983 24 p refs
(Contract DE-AC02-80ER-10632)
(DE83-006238; DOE/ER-10632/4) Avail: NTIS HC A02/MF A01

Using a laser total internal reflection system, the energetic threshold was mapped for photocurrent sensitized excited singlet dye molecules adsorbed on the surface of SrTiO3 single crystals. The results, obtained in terms of the quantum efficiency of photocurrent production (phi), are compared with theory and implications summarized. Data are presented from an initial study of the photoxidation of triphenylmethane dyes at gold electrodes which utilized spectroelectrochemical internal reflection spectroscopy. The progress in dye sensitization experiments with triplets and dye aggregates is outlined. DOE

N83-25837# Physical Sciences, Inc., Andover, Mass.
EFFECTS OF PREIGNITION ON PULVERIZED-COAL COMBUSTION Final Report, 19 Sep. 1980 - 30 Sep. 1982
G. A. Simons, G. Kothandaraman, S. P. Schertzer, and M. J. Palm Dec. 1982 183 p refs
(Contract DE-AC22-80PC-30293)
(DE83-004371; DOE/PC-30293/8) Avail: NTIS HC A09/MF A01

The effects of preignition of pulverized-coal combustion are discussed. The objectives of the program are to: optimize the reactivity of the coal char with respect to variations in the pore structure that occur during pretreatment, and develop a porous transport theory that can be used to extract the dominant primary secondary chemical reactions from existing pyrolysis data. The data obtained for Texas Lignite suggest that porosity (hence reactivity) is strongly dependent on the final pyrolysis temperature with the maximum porosity occurring at 1300 K. The data also indicate that, to a lesser extent, the heating rate affects pore structure. Higher heating rates increase the relative number of large pores and can enhance reactivity by a factor of two. Hence, the optimum pore structure for char reactivity may be obtained by preparing char at 1300 K and high heating rates (more than 100 K/s). Such chars could be four times as reactive as chars prepared at 2000 K and 1 to 10 K/s. DOE

N83-25838# Aerospace Corp., El Segundo, Calif.
INFRARED SPECTROSCOPY AND RADIOMETRY OF HIGH-EXPLOSIVE DETONATIONS: THE LOS ALAMOS EXPERIMENTS
Ernest H. Rogers, Ronald L. Williams, E. N. Frazier, Donald K. Stone, K. C. Herr, R. M. Young, and R. G. Robbins 1 Nov. 1982 178 p refs Sponsored by DOE
(DE83-003425; ATR-82(7991)-1) Avail: NTIS HC A09/MF A01

The purpose of these experiments was to determine whether the infrared spectra of high-explosive detonations can be used to infer the type of explosive material and/or the containment material employed. Infrared spectra and radiometric traces were measured during a test series of twenty-three donations; some were contained and some uncontained. The infrared spectra of the delayed or afterburn phase of explosions often displayed molecular emission and absorption features. Absorption by NH3 was observed when C-4 was the high-explosive material, and not observed for any other material. Emissions from H2O and CO2 were observed part of the time. Their occurence does not seem to be correlated with the type of containment or type of high-explosive material, or peak temperature reached in the afterburn. From the radiometric traces, one concludes that the relative peak radiance from the burn and afterburn phases depend strongly on the type of high-explosive material. DOE

N83-25839# California Univ., Berkeley. Lawrence Berkeley Lab. Energy and Environment Div.
FLAME PROPAGATION WALL HEAT TRANSFER, AND THEIR INTERACTION IN LEAN PREMIXED GASES
J. B. Woodward, D. H. Tarvo, R. Greif, and R. F. Sawyer Feb. 1982 29 p refs Presented at the 19th Intern. Symp. on Combust., Haifa, Israel, 8 Aug. 1982
(Contract W-7405-eng-48)
(DE82-008432; LBL-13950; CONF-820801-7) Avail: NTIS HC A03/MF A01

Simultaneous data on single event flame propagation, wall heat transfer, and their interaction were obtained for a constant volume chamber. Pressure variation, wall temperature variation, and high speed schlieren movies were recorded for the combustion of methane and air for various equivalence ratios. Flame speed and wall heat flux variation with respect to time were calculated from the data. The results indicate that there are important geometry effects on flame speed due to the location of the flame relative to the location of the heat transfer measurement. Peak heat flux values occur when the flame passes the location of measurement. High ignition energies are found to overdrive the rate of flame propagation. DOE

N83-25840# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
THERMAL DECOMPOSITION OF MAGNESIUM AND CALCIUM SULFATES Ph.D. Thesis
Susan L. Roche Apr. 1982 88 p refs
(Contract W-7405-eng-48)
(DE82-015000; LBL-14303) Avail: NTIS HC A05/MF A01

The effect of catalyst on the thermal decomposition of MgSO4 and CaSO4 in vacuum was studied as a function of time in Knudsen cells and for MgSO4, in open crucibles in vacuum in a Thermal Gravimetric Apparatus. Platinum and Fe2O3 were used as catalysts. The CaSO4 decomposition rate was approximately doubled when Fe2O3 was present in a Knudsen cell. Platinum did not catalyze the CaSO4 decomposition reaction. The initial decomposition rate for MgSO4 was approximately 5 times greater than when additives were present in Knudesen cells but only about 1.5 times greater when decomposition was done in an open crucible. DOE

N83-25841# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Abteilung Stroemung und Verbrennung.
A NEW COMBUSTION SYSTEM FOR BURNING LIGHT DISTILLATE FUEL OIL
Heinrich Eickhoff Sep. 1982 20 p refs Presented at 30th Aerodyn. Panel Meeting and 16th Intern. Flame Res. Found. Meeting, San Donato Milanese, Italy
(DFVLR-Mitt-83-01) Avail: NTIS HC A02/MF A01; DFVLR, Cologne DM 10,90

A controllable small air blast burner unit was developed which works well in the power range necessary for an optimum operation with regard to the overall efficiency of a residential heating system. The polluant emissions, CO as well as NO are low. Due to the nature of the system the air pressure drop is far above that of conventional domestic burners. Present development of the combustion system is mainly directed towards a reduction of the air pressure drop and the amount of excess air. Author (ESA)

N83-25842# State Univ. of New York at Buffalo, Amherst.
EVALUATION OF COMBUSTION AND CLEANUP OF SRC-2 COAL-DERIVED LIQUID FUEL
S. W. K. Weller, L. A. Kennedy, and D. T. Shaw Oct. 1982 35 p Sponsored by New York State Energy Research and Development Authority
(PB83-147355; NYERDA-82-09) Avail: NTIS HC A03/MF A01 CSCL 21B

An exploratory study of the long-term stability and combustion characteristics of SRC-II, a coal-derived liquid fuel oil, is described. It was designed to investigate the effects of long-term aging on physical characteristics, the characterization of potential NOx and SOx and the combustion products' interaction with hot gas cleanup hardware. It is shown that fuels such as SRC-II may absorb excessive amounts of oxygen and that aging SRC-II at 50C products a steady increase in the fuel's viscosity. While the report concludes that this fuel meets hardware and environmental restraints in the laboratory, long-term tests need to be conducted to determine whether this holds true in field situations. GRA

N83-25843# Bureau of Mines, Albany, Oreg. Research Center.
CALCINATION OF ALUMINUM NITRATE NONAHYDRATE IN A FLUIDIZED BED Report of Investigations, 1982
Jack C. White, Jack L. Henry, and Davis E. Traut Oct. 1982 29 p refs
(PB83-144618; BM-RI-8705; LC-82-600217) Avail: NTIS HC A03/MF A01 CSCL 21B

The production of alumina by the nitric and leaching of kaolinitic clay was investigated by the Bureau of Mines. A fluidized-bed system for the calculation of aluminum nitrate nonahydrate to alumina, while recoverying nitric acid was designed, built, and tested. GRA

N83-25844# Commission of the European Communities, Luxembourg.
RECORD OF WORK ON NOVEL ELECTROCATALYSTS FOR ADVANCED ELECTROLYSIS Final Report
L. Martin, J. Diette, M. Prigent, M. Bernard, J. Demarsy, and C. Sellier Dec. 1982 92 p Transl. into ENGLISH from Inst. Francais du Petrole (France), report no. 7068, 1981 109 p
(PB83-144923; EUR-7068-EN) Avail: NTIS HC A05/MF A01 CSCL 07D

This study carried out jointly by IFP and SRTI aims at obtaining an electrolytic cell with a potential around 1.6 V in the 160-200C temperature range. IFP have investigated the composition of the catalysts used and methods of applying them to the electrodes. Trails of short duration have been carried out at 80C and 1 A./sq cm current density; a physical-chemical examination of the electrodes has been made before and after use. SRTI have been concerned with the study of alkaline electrolysis up to 200C in aqueous medium, the optimization of electrode geometry and the activation of the electrodes by electrochemical processes. Endurance trials of several hundred hours have been carried out. Results have shown that catalytic activation of electrodes is an efficient method of improving electrolytic output. GRA

N83-25845# Regional Research Lab., Jorhat (India).
DEHYDRATION OF ETHANOL TO ETHYLENE: STATUS OF TECHNOLOGY
G. S. Patil, comp. and K. V. Raghavan, comp. 1982 53 p
(PB83-144931) Avail: NTIS HC A04/MF A01 CSCL 07D

Details of production of Ethylene from Ethanol are given. The various advantages and disadvantages of production of Ethylene from Ethanol are also discussed. This report is divided into 5 sections namely, Introduction; Catalyst Studies; Mechanisms and Kinetics; Technological aspects; and references. Author

N83-25846# Cadre Corp., Atlanta, Ga.
OXY-FUEL BURNER DEVELOPMENT PROGRAM Final Report, Jul. 1981 - May 1982
G. M. Gitman, D. D. Battles, D. B. Smith, and L. T. West May 1982 68 p refs
(PB83-136218; GRI-81/10029) Avail: NTIS HC A04/MF A01 CSCL 13A

An oxy-fuel burner for electric arc furnaces that overcomes the reliability and durability problems inherent in existing designs was developed and laboratory tested. A ten million B/hr laboratory scale burner was developed and successfully tested. The burner is designed to mount permanently on the furnace wall and to generate a strongly directional, high velocity flame. The graphite burner body is designed to withstand the severe environment of an electric arc furnace with a minimum amount of cooling water. GRA

N83-25847# Yale Univ., New Haven, Conn. Section of Applied Physics.
IN SITU MONITORING OF ELECTROCHEMICAL REACTIONS BY SURFACE ENHANCED RAMAN SCATTERING Final Report, 1 Jul. 1980 - 31 Aug. 1982
Richard K. Chang Nov. 1982 38 p Sponsored by Gas Research Inst.
(PB83-161430; GRI-81/0116) Avail: NTIS HC A03/MF A01 CSCL 07D

Several aspects of the recently discovered surface enhanced Raman scattering (SERS) from molecules adsorbed on a metal-liquid or metal-gas interface were investigated. The topic of SERS from the applications aspect was pursued concentrating mainly on the correlation between the SERS spectra of adsorbed molecular species and the electrochemical cyclic voltammograms. This ability to provide molecular specific information on ions and molecules addsorbed on noble metal (Ag, Au, and Cu) electrodes, immersed in various electrolytes and controlled by a potentiostat, has eventual relevance to the H2/O2 Pt-acid fuel cell system. The monitoring of adsorbed molecules catalytically formed on Ag powder catalysts which was briefly exposed to SO2, O2, O3, NO, or NO2 gas introduced into a purging He gas stream. GRA

N83-25848# Pennsylvania State Univ., University Park. Dept. of Materials Science and Engineering.
LASER MICROPYROLYSIS OF COAL MACERALS Annual Report, 1 Oct. 1981 - 30 Sep. 1982
F. J. Vastola 23 Sep. 1982 27 p Sponsored by Gas Research Inst.
(PB83-161422; GRI-81/0107) Avail: NTIS HC A03/MF A01 CSCL 07D

A mass analysis of the pyrolysis products, generated by heating selected coal macerals with the focused output of a pulsed ruby laser, is obtained by pyrolyzing a monolithic coal sample in the ionization chamber of a time of flight mass spectrometer. A high speed data acquisition system is used to record 32 spectra during the pyrolysis process (1-4 ms). A high degree of reproductibility is obtained by averaging sequential spectra. Although unit mass resolution is not obtained, all coals investigated exhibited mass groupings that were classified into 15 defined mass ranges. The relative intensities and envelope shape of these mass clusters were used to determine the degree of aromaticity and hydroaromaticity as well as the presence of oxygen groups in the coal macerals. GRA

N83-25849*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
LASER SYSTEM FOR NATURAL GAS DETECTION. PHASE 1: LABORATORY FEASIBILITY STUDIES Annual Report, Oct. 1980 - Dec. 1981
William B. Grant and E. David Hinkley 21 Jul. 1982 43 p refs (Contract NAS7-100)
(NASA-CR-170353; NAS 1.26:170353; GRI-80/0128; Rept-5030-525) Avail: NTIS HC A03/MF A01 CSCL 07D

This project demonstrated the feasibility of using laser remote sensing technology as a tool for leak survey work in natural gas distribution systems. A laboratory device was assembled using a pair of helium neon (HeNe) lasers to measure methane. One HeNe laser emits radiation at a wavelength of 3.3922 micrometers, which corresponds to a strong absorption feature of methane, while the other emits radiation at a wavelength of 3.3911 micrometers, which corresponds to a weak absorption by methane. As a particular

area is scanned for leaks, the laser is pointed at convenient topographic targets within its operating range, about 25 m. A portion of the backscattered radiation is collected by a receiver and focused onto an indium antimonide (InSb) photodetector, cooled to 77K. Methane concentrations were determined from the differential absorption at the two wavelengths for the backscattered radiation. GRA

N83-25850# SRI International Corp., Menlo Park, Calif.
LABORATORY PROTOCOLS FOR EVALUATING THE FATE OF ORGANIC CHEMICALS IN AIR AND WATER Final Report, Jun. 1977 - Jan. 1980
T. Mill, W. R. Mabey, D. C. Bomberger, T.-W. Chou, and D. G. Hendry Jul. 1982 338 p refs
(Contract EPA-68-03-2227)
(PB83-150888; EPA-600/3-82-022) Avail: NTIS HC A15/MF A01 CSCL 07D

Laboratory test procedures (or protocols) were developed to provide data useful in evaluating the environmental fate of organic compounds in natural aquatic systems and in the atmosphere. Screening level protocols are described to estimate rate constants for hydrolysis, photolysis, oxidation, biotransformation, and volatilization processes in natural aquatic systems; a screening protocol for measurement of partition coefficients for sorption of organic chemicals to sediments is also described. Detailed test protocols were developed for the hydrolysis, photolysis, volatilization, and sediment-sorption processes to obtain more accurate and precise data for use in environmental assessments applied to aquatic systems. GRA

N83-25851# Dow Chemical Co., Walnut Creek, Calif.
DEVELOPMENT OF NEW CLEANING TECHNIQUES FOR REVERSE OSMOSIS MEMBRANES
Jolaine A. Johnson and Thomas M. Leahy 30 Mar. 1982 186 p refs
(Contract DI-14-34-0001-8519)
(PB83-146746; W83-01369; OWRT-C-80152-S(8519)(1)) Avail: NTIS HC A09/MF A01 CSCL 07D

Reverse osmosis permeators are susceptible to fouling by suspended solids in the feedwater. Several cleaning methods for the control of silt fouling were tested and compared. The flow reversal cleaning method, where a permeator flush stream is periodically switched from a feed to brine to a brine to feed flow direction, appeared the most effective of the methods tested. When cleaning techniques were combined, cleaning effectiveness was improved slightly. The addition of a surfactant to the cleaning flush stream improved the effectiveness of all of the cleaning methods by an average of 55%. Comparison of performance results between separate testing phases indicates that experimental operating conditions were not consistent between phases. GRA

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N83-25852# Massachusetts Inst. of Tech., Cambridge.
STRUCTURE-PROPERTY RELATIONSHIPS IN RSP STEELS
G. B. Olson, M. Cohen, and G. J. Yurek Dec. 1982 4 p refs Presented at the 3rd Conf. on Rapid Solidification Processing Principles and Technol., Gaithersburg, Md., 6-8 Dec. 1982
Avail: NTIS HC A02/MF A01

Rapid solidification of austenitic and martensitic steels via centrifugal atomization is found to produce significant refinement of inclusion phases. The thermal stability of the fine inclusions makes them effective grain-boundary pinning particles in hot-consolidated materials, accounting for unusual resistance to grain coarsening at high austenitizing temperatures. This allows the improvement of sharp-crack fracture toughness by high austenitizing treatments without the reduction in blunt-notch toughness and tensile ductility which may otherwise accompany excessive grain coarsening. Experiments on a 4Mo-0.25C martensitic steel demonstrate that high austenitizing significantly improves the KIC toughness of both RSP and conventionally-processed materials, but the finer-grained RSP material has a 60 C lower Charpy ductile-brittle transition temperature. The fine-inclusion dispersion and grain-coarsening resistance also enhances the oxidation resistance of an RSP 303 austenitic stainless steel; this effect is attributed to promotion of oxide scale formation and mechanical keying of the scale by the fine grain size and dispersed inclusions. Author

N83-25853*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SOLID PARTICLE IMPINGEMENT EROSION CHARACTERISTICS OF CYLINDRICAL SURFACES, PRE-EXISTING HOLES AND SLITS
P. Veerabhadra Rao and Donald H. Buckley 1983 23 p refs Presented at the Cavitation and Multiphase Flow Forum, Houston, Tex., 20-22 Jun. 1983; sponsored by the ASME
(NASA-TM-83322; E-1526; NAS 1.15:83322) Avail: NTIS HC A02/MF A01 CSCL 11F

The erosion characteristics of aluminum cylinders sand-blasted with both spherical and angular erodent particles were studied and compared with results from previously studied flat surfaces. The cylindrical results are discussed with respect to impact conditions. The relationship between erosion rate and pit morphology (width, depth, and width to depth ratio) is established. The aspects of (1) erosion rate versus time curves on cylindrical surfaces; (2) long-term exposures; and (3) erosion rate versus time curves with spherical and angular particles are presented. The erosion morphology and characteristics of aluminum surfaces with pre-existing circular cylindrical and conical holes of different sizes were examined using weight loss measurements, scanning electron microscopy, a profilometer, and a depth gage. The morphological features (radial and concentric rings) are discussed with reference to flat surfaces, and the erosion features with spherical microglass beads. The similarities and differences of erosion and morphological features are highlighted. The erosion versus time curves of various shapes of holes are discussed and are compared with those of a flat surface. The erosion process at slits is considered. A.R.H.

N83-25854*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
PRELIMINARY SCIENCE REPORT ON THE DIRECTIONAL SOLIDIFICATION OF HYPEREUTECTIC CAST IRON DURING KC-135 LOW-G MANEUVERS
P. A. Curreri, D. M. Stefanescu, and J. C. Hendrix Apr. 1983 23 p refs
(NASA-TM-82528; NAS 1.15:82528) Avail: NTIS HC A02/MF A01 CSCL 11F

An ADSS-P directional solidification furnace was reconfigured for operation on the KC-135 low-g aircraft. The system offers many advantages over quench ingot methods for study of the effects of sedimentation and convection on alloy formation. The directional sodification furnace system was first flown during the September 1982 series of flights. The microstructure of the hypereutectic cast iron sample solidified on one of these flights suggests a low-g effect on graphite morphology. Further experiments are needed to ascertain that this effect is due to low-gravity and to deduce which of the possible mechanisms is responsible for it. Author

N83-25855# Ohio State Univ., Columbus. Dept. of Metallurgical Engineering.
FUNDAMENTAL STUDIES OF HIGH-TEMPERATURE-CORROSION REACTIONS Technical Progress Report
R. A. Rapp Feb. 1983 19 p refs
(Contract DE-AC02-79ER-10404)
Avail: NTIS HC A02/MF A01

From hot-stage environmental scanning electron microscopic experiments with nickel and iron oxidation, the recurring central issue is the importance of screw dislocation in providing ledges

for the growth of oxides obviously at the scale/gas interface, but also at the scale/gas interface across any gap which is generated. Several mechanistic implications are clear, although the necessary supporting scientific studies are generally lacking. For example, surface diffusion for cations at any oxide/gas interface must be quite rapid, although such data are not generally available. The surface free energies of some oxides (certainly wustite and NiO), but apparently no Cu2O are quite anisotropic, and therefore steady-state surface features show pyramidal grains or flat-sided pits. The diffusion flux up the core of an oxide whisker is very high, and must therefore correspond to the presence of a superdislocation with a high Burgers vector, so that the hollow internal core provides surface diffusion. DOE

N83-25856# Selskapet for Industriell og Teknisk Forskning, Trondheim (Norway).
FACTORS CONTROLLING WELD METAL CHEMISTRY Final Technical Report, period ending Jun. 1982
O. Grong and N. Christensen Jun. 1982 43 p refs
(Contract DAJA37-81-C-0309; DA Proj. 1T1-161102-BH-57)
(AD-A124477; SINTER-341094) Avail: NTIS HC A03/MF A01 CSCL 13/8

This work is intended to elucidate the kind and extent of chemical interaction in the four main steps of the GMA process: (1) electrode tip, (2) arc column, (3) hot part of weld pool, and (4) cooling part of weld pool. Identification of reaction sites has been made by local sampling and by suppressing the weld pool stage in welding onto a fast spinning cold copper wheel. Each stage may be briefly described. GRA

N83-25857# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.
FRACTURE TOUGHNESS OF HIGH STRENGTH STEEL PREDICTED FROM CHARPY ENERGY OR REDUCTION-IN-AREA Final Technical Report
J. H. Underwood and G. S. Leger Dec. 1982 39 p refs Presented at the 15th ASTM Symp. on Fracture Mech., College Park, Md., 7-9 Jul. 1982 Submitted for publication
(AD-A123760; ARLCB-TR-82030) Avail: NTIS HC A03/MF A01 CSCL 11/6

Analysis is presented of the results of an extensive mechanical and fracture test program. Ninety-six hollow cylinder forgings of A723 steel with five different manufacturing processes were tested at two locations with different outer diameters. Yield strength, plane-strain fracture toughness, Charpy impact energy, and tensile reduction-in-area were measured and analyzed for statistical variation and difference of mean value. Linear regression was used to fit lines to the data and to determine correlation coefficients. Conclusions were drawn as to the suitability of Charpy energy and reduction-in-area as predictors of plane-strain fracture toughness. Author (GRA)

N83-25858# Battelle Pacific Northwest Labs., Richland, Wash.
WEAR BEHAVIOR IN THIN LAYERED Au/SS AND Au/Mo COATINGS Final Report
E. L. Courtright and J. W. Patten Aug. 1982 43 p refs
(Contract N00014-79-C-0416)
(AD-A123904) Avail: NTIS HC A03/MF A01 CSCL 11/3

Principal objectives of this work were to (1) determine if the Delamination Theory of wear could be supported by experimentally observing improved wear resistance from samples coated with thin layers of gold at or below the critical thickness; and (2) to determine if laminate coatings made of alternate soft and hard materials could provide extended wear resistance. Wear tests were performed on thin layers of sputtered gold against a 52100 steel slider. Both wear rate and debris particle size decreased with decreasing coating thickness in accordance with the Delamination Theory of wear. However, for thin coatings of 250 A or less, the softer gold wore through exposing a harder stainless steel substrate. Much larger debris particles were produced when this occurred as the active shear zone apparently penetrated more deeply into the base material. Protective laminate coatings prepared by sputtering alternate layers of Au/SS and Au/Mo did not wear by progressive attrition of each layer. Debris particles several layers in thickness were formed giving rise to apparent dislocation penetration, plastic deformation, and fracture across the interfaces. Author (GRA)

N83-25859# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Materials Engineering.
THE EFFECT OF THERMAL CYCLING ON THE THERMOELASTIC MARTENSITIC TRANSFORMATION IN A Cu-Zn-Al ALLOY
Jian-Chun Li and G. S. Ansell Dec. 1982 20 p refs Submitted for publication
(Contract N00014-67-A-0177-0011; NR Proj. 031-689)
(AD-A124108; TR-13) Avail: NTIS HC A02/MF A01 CSCL 11/6

The effect of thermal cycling between the M(f)-A(f) on the thermal hysteresis, temperature dependence, and the morphology of the martenistic transformation in a Cu-Zn-Al alloy was studied. The hysteresis behavior of the cyclic transformation, as characterized by following the change in electrical resistivity accompanying the transformation changed in two respects: First, the M(s) and A(f) temperature shifted to higher temperatures while the M(f) and A(s) temperatures remained constant, secondly, the amount of martensite undergoing cyclic transformation decreased. These changes appeared to saturate at 300 cycles and could be partly recovered during room temperature aging. The morphology and mode of transformation also changed. During the first few cycles, transformation occurred in two simultaneous ways: (1) as martensite plates which are observed to grow and thicken in a continuous manner; and (2) as plates which form in a burst process. After 60 cycles no burst type transformation occurred during cooling and plate growth and thickening was stepwise. Author (GRA)

N83-25860# Avco-Everett Research Lab., Mass.
LASER DENSIFICATION OF PLASMA SPRAYED REFRACTORY METAL COATINGS ON 4300 STEEL Final Report, Jan. 1980 - Mar. 1982
O. Sandven Watertown, Mass. AMMRC Dec. 1982 59 p refs
(Contract DAAG46-80-C-0044; DA Proj. 1L1-62105-AH-84)
(AD-A123936; AMMRC-TR-82-58) Avail: NTIS HC A04/MF A01 CSCL 19/6

This program investigated the feasibility of surface melting and densification of plasma sprayed refractory metal coatings on SAE 4340 steel by means of a 15 kW CO2 laser. The refractory metals and alloys investigated were: Tantalum, TA-lOW, Molybdenum and the Columbian base alloys WC 103 and WC 3015. True cladding, by melting of the plasma sprayed coatings, could not be achieved without damage to the substrate, or without alloying with the substrate. Partial melting or densification could be obtained, but pore formation and contamination by oxygen and nitrogen from the ambient atmosphere occurred in nearly all cases. It may, however, be possible to overcome these problems by improving the protective atmosphere used for the processing; and by laser processing the refractory metals in the form of loose powder on the substrate surface rather than as a plasma sprayed layer. Cladding of SAE 4340 steel with Stellite No. 12 was also investigated. Good, fully dense continuous layers, approx. 0.07 in. thick, with a hardness of Rc 48-50, were obtained. Author (GRA)

N83-25861# Pennsylvania Univ., Philadelphia. Dept. of Materials Science and Engineering.
ANNEALING EFFECTS IN FERROMAGNETIC AMORPHOUS ALLOYS Annual Report, 1 Aug. 1981 - 31 Jul. 1982
C. D. Graham, Jr. and T. Egami 4 Jan. 1983 5 p refs
(Contract N00014-80-C-0896; NR Proj. 039-204)
(AD-A124048; TR-2) Avail: NTIS HC A02/MF A01 CSCL 11/6

Annealing effects in low-magnetostriction ferromagnetic amorphous alloys have been investigated by torque measurements and by time-decay of permeability. A model to account for the results has been proposed, based on the independent reorientation of easy axes in small clusters of atoms. Author (GRA)

N83-25862# Lehigh Univ., Bethlehem, Pa. Center for Surface and Coatings Research.
CORROSION CONTROL THROUGH A BETTER UNDERSTANDING OF THE METALLIC SUBSTRATE/ORGANIC COATING/INTERFACE Annual Report, 1 Sep. 1981 - 31 Aug. 1982
Henry Leidheiser, Jr., Eugene M. Allen, Mohamed S. El-Aasser, Frederick M. Fowkes, John A. Manson, Fortunato J. Micale, David A. Thomas, Gary W. Simmons, and John W. Vanderhoff 1 Dec. 1982 262 p refs
(Contract N00014-79-C-0731)
(AD-A124044; AR-3) Avail: NTIS HC A12/MF A01 CSCL 11/6

Corrosion potential measurements, polarization resistance studies and cathodic delamination studies provide evidence that steel abrasively blasted with alumina exhibits a lower initial rate of corrosion in mild media than similar steels blasted with steel grit or abraded with silicon carbide paper. Auger spectroscopy and electron microprobe analysis revealed the presence of significant aluminum on the surface, largely in the form of embedded particles but possibly also as a constituent of the oxide film. Nonmetallic abrasive blasting may have application in the chemical modification of metal surfaces. GRA

N83-25863# Naval Sea Systems Command, Washington, D. C.
POWDERED METAL SINTERING OF JET VANES Final Report, Feb. 1979 - 23 Feb. 1982
M. J. Ripley-Lotee, S. M. ONeil, J. H. Peterson, and K. E. Meiners Feb. 1982 87 p refs
(Contracts N00023-79-WR-9K242; N00123-80-C-0038)
(AD-A124082; NAVSEA-MT-S-587-79) Avail: NTIS HC A05/MF A01 CSCL 11/6

This report presents the successful efforts to use powdered metallurgy techniques in manufacturing jet vanes from sintered and copper infiltrated tungsten. Isostatic pressing of the powdered tungsten to net shape imparts sufficient hardening to allow handling and final shaping by use of conventional sanding belts. Relatively high pressures increase density to a predictable shrinkage during sintering. Only minor machining after copper infiltration is needed, reducing material usage and labor.
Author (GRA)

N83-25864# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.
THE EFFECT OF VELOCITY ON THE SLIDING BEHAVIORS OF COPPER ALLOYS Final Report
R. S. Montgomery Nov. 1982 29 p refs Submitted for publication
(DA Proj. 1L1-61102-AH-60)
(AD-A123869; AD-E440175; ARLCB-TR-82039) Avail: NTIS HC A03/MF A01 CSCL 11/6

This report is a study of the sliding behaviors of a number of copper alloys and other metals at various velocities. The research was carried out using the pin-on-disk friction and wear machine used for the work in ARRADCOM Technical Report ARLCB-TR-82018. The same three disk metals (AISI 4340 steel, chromium electroplate, and tantalum) and the same pin metals were also used. Previous experiments were at a sliding speed of 1.70 meters per second (m/s). In this work sliding speeds of 3.05 m/s and 0.58 m/s were added for most of the alloys sliding on steel. GRA

N83-25865# Stanford Univ., Calif. Dept. of Materials Science and Engineering.
AN INVESTIGATION OF THE STRUCTURE AND HIGH TEMPERATURE MECHANICAL PROPERTIES OF OXIDE DISPERSION STRENGTHENED ALLOYS Interim Scientific Report, 1 Oct. 1981 - 30 Sep. 1982
William D. Nix Dec. 1982 48 p refs
(Grant AF-AFOSR-0022-81; AF Proj. 2306)
(AD-A125199; AFOSR-82-1084TR) Avail: NTIS HC A03/MF A01 CSCL 11/6

The structure and high temperature mechanical properties of oxide dispersion strengthened alloys are being studied. We have observed and studied superplastic properties in fine grained MA 6000 and MA 754. These properties have been described by model which couples dislocation and diffusional creep. The creep properties of coarse grained MA 754 are also being studied. We have observed that cavitation contributes to the creep rate at low stresses and high temperatures and that grain boundary degradation occurs by diffusional processes. Work on the structure and properties of Al-Fe-Ce alloys is just starting. GRA

N83-25866# Oak Ridge National Lab., Tenn. Solvent Refined Coal Projects Office.
ANALYSIS OF ELEVATED-TEMPERATURE TENSILE AND CREEP PROPERTIES OF NORMALIZED AND TEMPERED 2 1/4 Cr-1 Mo STEEL
M. K. Booker, B. L. P. Booker, and R. W. Swindeman Jan. 1982 57 p refs
(Contract W-7405-eng-26)
(DE82-007472; ORNL/TM-8075) Avail: NTIS HC A04/MF A01

Tensile and creep data were collected for normalized and tempered 2 1/4 Cr-1 Mo steel from American, Japanese, British French, and German sources. These included creep data obtained at temperatures from 427 to 600 C (800 to 1112 F) and tensile data from room temperature to 550 C (1022 F). Properties examined included yield strength, ultimate tensile strength, creep-rupture strength, and creep strength. The data were analyzed by using lot-centered regression approaches that yielded expressions for the variations in the above properties with loading condition, as well as accounting for lot-to-lot variations in properties. No indications were found of systematic differences in any of the properties examined for data from he different countries. However, the estimated allowable stresses from this investigation fell up to 10% below those currently given for this material in the ASME Code. DOE

N83-25867# California Univ., Berkeley. Lawrence Berkeley Lab.
CAUSE OF PITTING IN BERYLLIUM
Robert P. Kershaw 16 Apr. 1982 25 p refs Presented at the Beryllium Subwog Meeting, Denver, 20-21 Apr. 1982
(Contract W-7405-eng-48)
(DE82-019433; UCRL-87370; CONF-820459-2) Avail: NTIS HC A02/MF A01

Light microscopy, bar film radiography, secondary ion mass spectroscopy, electron microprobe and physical testing were used to examine beryllium specimens exhibiting a stratified, pitted, pattern after chemical milling. The objective was to find the cause of this pattern. Specimens were found to have voids in excess of density specification allowances. These voids are attributed, at least in part, to the sublimation of beryllium fluoride during the vacuum hot pressing operation. The origin of the pattern is attributed to these voids and etching out of fines and associated impurities. Hot isostatic pressing with a subsequent heat treatment close residual porosity and dispersed impurities enough to correct the problem. DOE

N83-25868# Sandia Labs., Livermore, Calif. Exploratory Chemistry Div.
THERMAL CONVECTION LOOP STUDY OF CORROSION OF ALLOY 800 IN MOLTEN NaNO3
R. W. Bradshaw Jan 1983 29 p refs
(Contract DE-AC04-76DP-00789)
(DE83-006766; SAND-82-8911) Avail: NTIS HC A03/MF A01

Maximum metal loss rate of Alloy 800 coupons was about 0.5 mil/year and occurred at the maximum temperature of 6000 C. Significantly greater oxide penetration into the alloy occurred in unabraded as-received tubing. Since the corrosion rate of unabraded tubing was less temperature sensitive than polished coupons, and attained a maximum value of temperatures in the range of 550 to 5650 C, a value of 1 mil/year should be used as the corrosion rate for design purposes. Because daily thermal cycling is inherent in solar central receiver operation, oxidation and chromium depletion rates can be expected to increase if surface oxide layers spall. The oxide layers formed on Alloy 800 appeared to be adherent, and adherence will benefit further from growth-derived compressive stresses in oxide layers on the salt-exposed inner diameter of receiver tubes. Since the lower

duty factor in diurnal solar service may offset the accelerated metal loss due to cyclic spalling of scales, the corrosion rates reported here are probably sufficiently reliable for design purposes. Chromium depletion from the alloy was observed because of the high solubility of chromium in the melt. DOE

N83-25869# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
QUANTITATIVE STUDY OF VACANCY DEFECTS IN QUENCHED TUNGSTEN BY COMBINED FIELD-ION MICROSCOPY AND ELECTRICAL RESISTOMETRY
J. Y. Park (Argonne National Lab., Ill.), H. C. W. Huang (IBM Corp., Hopewell Junction, N.Y.), R. W. Siegel (Argonne National Lab., Ill.), and R. W. Balluffi Jan. 1983 41 p refs
(Contract DE-AC02-78ER-05002)
(DE83-006040; DOE/ER-05002/31) Avail: NTIS HC A03/MF A01

A study of quenched, high-purity tungsten was carried out with a combination of field-ion microscopy (FIM) and electrical resistivity measurements. It was concluded that the quenched-in vacancy defects observed by FIM were monovacancies and nearest-neighbor divacancies. From the partitioning during quenching between these two species, a divacancy binding enthalpy H/sub 2v/sup b/ approx. = 0.7 eV was deduced. A monovacancy resistivity of 7 x 10 to the 4th power (Lambda) cm was obtained from the combined measurements. The quenched-in vacancy concentrations directly measured by FIM are consistent with previous results, if the total vacancy concentration at the melting temperature of tungsten (3695 K) is about 3 x 10 to the 4th power and the monovacancy formation enthalpy and entropy are 3.6 eV and 3.2 k, respectively. Results are discussed in terms of the atomic-defect mechanisms for self-diffusion in tungsten. DOE

N83-25870# Ohio State Univ., Columbus.
HYDROGEN ATTACK OF PRESSURE-VESSEL STEELS Annual Report, 1 Jun. 1982 - 31 May 1983
Paul G. Shewmon 1983 10 p
(Contract DE-AC02-82ER-12077)
(DE83-006039; DOE/ER-12077/T1) Avail: NTIS HC A02/MF A01

Kinetics of hydrogen attack (HA) of 2 1/4 Cr-1 Mo base metal (BM), and weld metal (WM), quenched and tempered to meet ASME Code, were measured using a sensitive dilatometer. At 5000 C, and 20 MPa of H2, the weld metal grows an order of magnitude faster than does the base metal. Untempered base metal grows yet an order or magnitude faster than the tempered weld metal. The effect of temperature and pressure also was measured and differed for the three types of materials. Using a TEM-replica technique, the as-tempered material contains many submicron pores, all on the ends of carbides, and usually on grain boundaries. Hydrogen treatment at 550 C and 20 MPa of H2 lead to the sintering shut of three fourths of these, but the rest (the larger voids) grew into the methane bubbles that generate hydrogen attack (HA). The differences in the microvoid density between WM, RM, and heat affected zone (HAZ) were measured. They are definite, but not large. A 1020 carbon steel which nucleates bubbles sparingly was used to study the changes in the growth kinetics and morphology of methane bubbles with temperature, internal pressure, and bubble size. DOE

N83-25871# Mound Lab., Miamisburg, Ohio.
METALLOGRAPHY OF CONSOLIDATED THERMITES
M. D. Kelly and J. J. Cramer 1982 11 p refs Presented at 15th Ann. Intern. Metallographic Soc. Meeting, Orlando, Fla., 18 Jul. 1982
(Contract DE-AC04-76DP-00053)
(DE82-019172; MLM-2966-OP; CONF-820724-1) Avail: NTIS HC A02/MF A01

A process to press aluminum copper oxide and aluminum iron oxide thermites into strong, high density composites for use as chemical heat sources was developed. Metallography of the consolidated thermites and their reaction products required careful preparation in sectioning, grinding, and polishing because of the extreme differences in hardness between the metal matrix and the oxides. Using metallography as an analytical tool, consolidated thermites of uniform density and composition were evaluated. DOE

N83-25872# Mound Lab., Miamisburg, Ohio.
METALLOGRAPHY OF NIOBIUM/ALUMINA INTERFACES
M. D. Kelly 1982 11 p refs Presented at 15th Ann. Intern. Metallographic Soc. Meeting, Orlando, Fla., 18 Jul. 1982
(Contract DE-AC04-76DP-00053)
(DE82-019170; MLM-2967-OP; CONF-820724-2) Avail: NTIS HC A02/MF A01

Niobium pins were investigated as potential electrical feed-throughs in alumina ceramic components. The pins were diffusion bonded to the alumina substrates during sintering to form the feedthroughs. The resulting parts required metallography to evaluate the interfacial reactions. Metallographic techniques to properly prepare the niobium surface for analysis while maintaining the ceramic interface required etch polish techniques to remove the disturbed metal. The interfacial reactions observed show silicon niobium diffusion which results in a strong pin ceramic bond. DOE

N83-25873# Mound Lab., Miamisburg, Ohio.
DEW POINT/TEMPERATURE CURVES FOR SELECTED METAL/OXIDE SYSTEMS IN HYDROGEN ATMOSPHERES
M. C. Rey, D. P. Kramer, and W. R. Henderson 25 Jun. 1982 9 p refs
(Contract DE-AC04-76DP-00053)
(DE82-017231; MLM-2956) Avail: NTIS HC A02/MF A01

A new diagram for dew point as a function of temperature is developed for selected metal/metal oxide equilibria in hydrogen atmospheres. The new diagram constitutes a more accurate version of the original set of curves developed earlier by W.H. Chang. Experimental data are presented in verification of the newly calculated curves for the Zn-ZnO and the Cr-Cr2O3 equilibria. DOE

N83-25874# Mound Lab., Miamisburg, Ohio.
SCANNING AUGER MICROSCOPY OF CONSOLIDATED Al/Cu2O THERMITE PELLETS
P. S. Wang and W. E. Moddeman 1982 13 p refs
(Contract DE-AC04-76DP-00053)
(DE82-009046; MLM-2913(OP); CONF-820518-2) Avail: NTIS HC A02/MF A01

The outer and the fractured surfaces of hot pressed Al/Cu2O pellets were investigated by scanning Auger microscopy. The surface images and elemental pictures of aluminum and copper are illustrated. Auger spectra of the outer surface show the existence of carbon, chlorine, oxygen, and sodium as contaminants. Auger mapping of the grains gives a clear picture of the Cu2O particles and the general continuum of the aluminum. These pictures compare well with scanning electron micrographs taken previously of similar Al/Cu2O pellets. In depth elemental profiling by sputter etching illustrates that carbon, sodium, and chlorine are surface contaminants. The analysis of the fractured surface verified the presence of an interfacial region between the aluminum and the Cu2O of at least 100 A that was caused by the pelletization process at elevated temperatures. DOE

N83-25875# Sandia Labs., Albuquerque, N. Mex.
SURFACE MODIFICATION AND ALLOYING: ALUMINUM
S. T. Picraux and D. M. Follstaedt May 1982 70 p refs Submitted for publication
(Contract DE-AC04-76DP-00789)
(DE82-018440; SAND-82-0834) Avail: NTIS HC A04/MF A01

Ion implantation in combination with electron or laser beam pulsed heating provides a way to adjust the surface composition and microstructure of alloys independently of the usual equilibrium constraints. A variety of such surface modification studies were recently carried out in aluminum by several groups. Selected results from these studies are summarized in the present chapter, with the objective of better clarifying the fundamental mechanisms involved for the case of metals. Thus for a single host system,

the various aspects of directed energy modification of materials is discussed individually in previous chapters. DOE

N83-25876# Sandia Labs., Albuquerque, N. Mex.
EFFECT OF SURFACE PREPARATION AND HEAT TREATMENT ON THE INTERFACIAL RESISTANCE, FRICTION AND WEAR OF PRECIOUS-METAL ELECTRICAL-CONTACT ALLOYS
R. W. Rohde and L. E. Pope 1982 8 p refs Presented at Holm Conf. on Elec. Contacts, Chicago, 1 Sep. 1982
(Contract DE-AC04-76DP-00789)
(DE82-012335; SAND-81-2598C; CONF-820912-1) Avail: NTIS HC A02/MF A01

The precious metal alloy couple (Pd-Ag-Cu-Au-Pt with Au-Cu-Pt-Ag) finds wide application as a wiping electrical contact. Experience at this laboratory in component applications has indicated that surface preparation methods have a substantial effect on subsequent contact performance. Additionally, investigations at Sandia have shown that the normally recommended heat treat process is in a time and temperature regime where alloy properties are rapidly changing. This can easily cause batch to batch variations in material properties such as microstructure, hardness and bulk resistance. The effects of surface preparation and heat treatment on the contact resistance, friction and wear of the alloy couple were investigated. DOE

N83-25877# Oak Ridge National Lab., Tenn.
INFLUENCE OF TEMPERATURE, ENVIRONMENT AND THERMAL AGING ON THE CONTINUOUS CYCLE FATIGUE BEHAVIOR OF HASTELLOY X AND INCONEL 617
J. P. Strizak, C. R. Brinkman, M. K. Booker, and P. L. Rittenhouse Apr. 1982 50 p refs
(Contract W-7405-eng-26)
(DE82-012494; ORNL/TM-8130) Avail: NTIS HC A03/MF A01

Results are presented for strain controlled fatigue and tensile tests for two nickel base, solution hardened reference structural alloys for use in several high temperature gas cooled reactor concepts. These alloys, Hastelloy X and Inconel 617, were tested from room temperature to 871 C in air and impure helium. Materials were tested in both the solution annealed and the preaged condition, in which aging consisted of isothermal exposure at one of several temperatures for periods of up to 20,000 h. Comparisons are given between the strain controlled fatigue lives of these and several other commonly used alloys, all tested at 538 C. An analysis is also presented of the continuous cycle fatigue data obtained from room temperature to 427 C for Hastelloy G, Hastelloy X, Hastelloy C-276, and Hastelloy C-4, an effort undertaken in support of ASME code development. DOE

N83-25878# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
INTERSTITIAL-PHASE PRECIPITATION IN IRON-BASE ALLOYS: A COMPARATIVE STUDY Ph.D. Thesis
A. R. Pelton Jun. 1982 167 p refs
(Contract DE-AC03-76SF-00098)
(DE82-020127; LBL-14643) Avail: NTIS HC A08/MF A01

Recent developments have elucidated the atomistic mechanisms of precipitation of interstitial elements in simple alloy systems. However, in the more technologically important iron base alloys, interstitial phase precipitation is generally not well understood. The present experimental study was therefore designed to test the applicability of these concepts to more complex ferrous alloys. Hence, a comparative study was made of interstitial phase precipitation in ferritic Fe-Si-C and in austenitic phosphorus-containing Fe-Cr-Ni steels. These systems were subjected to a variety of quench-age thermal treatments, and the microstructural development was subsequently characterized by transmission electron microscopy. DOE

N83-25879# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.
FLOW LINES AND MICROSCOPIC ELEMENTAL INHOMOGENEITIES IN AUSTENITIC STAINLESS STEEL
W. Clanton Mosley, Jr. 1982 13 p refs Presented at the 16th Ann. Meeting of the Microbeam Analysis Soc., Washington, 9-13 Aug. 1982
(Contract DE-AC09-76SR-00001)
(DE82-008918; DP-MS-81-125; CONF-820807-1) Avail: NTIS HC A02/MF A01

Flow lines in mechanically formed austenitic stainless steels are known to influence fracture behavior. Enhancement of flow lines by chemical etching is evidence of elemental inhomogeneity. The results of electron microprobe analyses to determine the nature of flow lines in three austenitic stainless steels: 21Cr-6Ni-9Mn, 304L, and 19Ni-18Cr are presented. DOE

N83-25880# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.
HYDROGEN EFFECTS IN HIGH-PURITY STAINLESS STEELS
G. R. Caskey, Jr. 1982 7 p refs In ENGLISH; FRENCH summary Presented at the 3d Intern. Congr. on Hydrogen and Mater., Paris, 7-11 Jun. 1982
(Contract DE-AC09-76SR-00001)
(DE82-015513; DP-MS-81-80; CONF-820625-2) Avail: NTIS HC A02/MF A01

Internal and environmental hydrogen damage to three pure stainless steels (19% Cr and 10, 14 or 19% Ni) were evaluated by tensile tests. Concentrations of C, Mn, Si and P were less than in commercial alloys. Susceptibility of the pure alloys to hydrogen damage was comparable to that of commercial austenitic stainless steels. DOE

N83-25881# Sandia Labs., Albuquerque, N. Mex. Materials Science Div.
MICROSTRUCTURAL ORIGIN OF THE SKELETAL FERRITE MORPHOLOGY OF AUSTENITIC STAINLESS STEEL WELDS
J. A. Brooks, J. C. Williams, and A. W. Thompson Apr. 1982 36 p refs Prepared in cooperation with Carnegie-Mellon Univ., Pittsburgh
(Contract DE-AC04-76DP-00789)
(DE82-014185; SAND-82-8667) Avail: NTIS HC A03/MF A01

Scanning transmission electron microscopy was conducted on welds exhibiting a variety of skeletal, or vermicular ferrite morphologies in addition to one lathy ferrite morphology. These ferrite morphologies result from primary ferrite solidification followed by a solid state transformation upon cooling. During cooling, a large fraction of the ferrite transforms to austenite leaving a variety of ferrite morphologies. Comparison of composition profiles and alloy partitioning showed both the skeletal and lathy ferrite structures resulting from a diffusion controlled solid state transformation. However, the overall measured composition profiles of the weld structure are a result of partitioning during both solidification and the subsequent solid state transformation. DOE

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N83-25882*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
FRICTION, WEAR, TRANSFER AND WEAR SURFACE MORPHOLOGY OF ULTRA-HIGH-MOLECULAR-WEIGHT POLYETHYLENE
Robert L. Fusaro 1983 30 p refs Presented at the Joint Lubrication Conf., Hartford, 18-20 Oct. 1983; sponsored by the American Society of Lubrication Engineers and the ASME
(NASA-TM-83364; E-1629; NAS 1.15:83364) Avail: NTIS HC A03/MF A01 CSCL 11G

Tribological studies at 25 C in a 50-percent-relative-humidity air atmosphere were conducted using hemispherically tipped 440 C HT (high temperature) stainless steel pins sliding against ultra-high-molecular-weight polyethylene (UHMWPE) disks. The results indicate that sliding speed, sliding distance, contact stress and specimen geometry can markedly affect friction, UHMWPE wear, UHMWPE transfer and the type of wear mechanisms that

occur. Adhesion appears to be the predominant wear mechanism; but after long sliding distances at slow speeds, heavy ridges of transfer result which can induce fatigue-like wear on the UHMWPE disk wear track. In one instance, abrasive wear to the metallic pin was observed. This was caused by a hard particle embedded in the UHMWPE disk wear track. Author

N83-25883*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SPHERICAL MICRO-GLASS PARTICLE IMPINGEMENT STUDIES OF THERMOPLASTIC MATERIALS AT NORMAL INCIDENCE
P. Veerabhadra Rao and Donald H. Buckley 1983 26 p refs Presented at the Joint Lubrication Conf., Hartford, 18-20 Oct. 1983; sponsored by the ASME and the American Society of Lubrication Engineers
(NASA-TM-83410; E-1591; NAS 1.15:83410) Avail: NTIS HC A03/MF A01 CSCL 11G

Light optical and scanning electron microscope studies were conducted to characterize the erosion resistance of polymethyl methacrylate (PMMA), polycarbonate (PC), polytetrafluoroethylene (PTFE) and ultra-high-molecular-weight-polyethylene (UHMWPE). Erosion was caused by a jet of spherical micro-glass beads at normal impact. During the initial stages of damage, the surfaces of these materials were studied using a profilometer. Material buildup above the original surface was observed on PC and PMMA. As erosion progressed, this buildup disappeared as the pit became deeper. Little or no buildup was observed on PTFE and on UHMWPE. UHMWPE and PTFE are the most resistant materials and PMMA the least. Favorable properties for high erosion resistance seem to be high values of ultimate elongation, and strain energy and a low value of the modulus of elasticity. Erosion-rate-versus-time curves of PC and PTFE exhibit incubation, acceleration and steady state periods. A continuously increasing erosion rate period was observed however for PMMA instead of a steady state period. At early stages of damage and at low impact pressure material removal mechanisms appear to be similar to those for metallic materials. Author

N83-25884*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CARBORANYLMETHYLENE-SUBSTITUTED PHOSPHAZENES, POLYMERS THEREOF AND PROCESS FOR THE PRODUCTION THEREOF Patent Applications
Harry R. Allcock (Pennsylvania State Univ., Univ. Park) and Angelo G. Scopelianos, inventors (to NASA) (Pennsylvania State Univ., Univ. Park) Filed 3 May 1983 19 p Sponsored by NASA
(NASA-Case-ARC-11370-1; US-Patent-Appl-SN-491125) Avail: NTIS HC A02/MF A01 CSCL 11G

Carboranylmethylene-substituted cyclophosphazenes which can be thermally polymerized into carboranylmethylene-substituted phosphazene polymers are useful as thermally stable coatings. Due to the characteristics of these polymers in acting as a ligand for transition metals, metallocarboranyl methylene phosphazene polymers can act as immobilized catalyst systems, and are electrically conductive and superconductive. NASA

N83-25885# Ford Motor Co., Dearborn, Mich.
CERAMIC LIFE PREDICTION METHODOLOGY. ANALYTICAL ASSESSMENT OF SELECTED COMPONENT DATA Interim Report, Jul. 1981 - Feb. 1982
L. R. Swank Watertown, Mass. Army Materials and Mechanics Research Center Sep. 1982 30 p refs
(Contract DAAG46-77-C-0028)
(AD-A123301; AMMRC-TR-82-50) Avail: NTIS HC A03/MF A01 CSCL 11/2

A complete set of thermal conditions, mechanical loads, geometry as well as thermal, elastic, fast fracture, and time dependent material properties was furnished by AMMRC for the hub of a gas turbine disc. A finite element computer model was prepared for the disc from this data. The temperature and stress distributions, the fast fracture and the time dependent reliabilities were calculated. The results were presented in iso-stress and iso-thermal plots and in graphical data. Author (GRA)

N83-25886# Naval Weapons Center, China Lake, Calif.
PROPERTIES OF POLYESTER RESINS FOR FIBERGLASS REINFORCED SOIL SURFACINGS Final Report, 1 Nov. 1980 - 31 Aug. 1982
A. L. Woodman and D. W. Moore Nov. 1982 43 p
(AD-A123247; NWC-TP-6406) Avail: NTIS HC A03/MF A01 CSCL 11/9

A Marine Corps chemical formulation developed for the construction of fiberglass reinforced plastic soil surfacings consists of a polyester resin, a catalyst, and a promoter solution. The baseline properties of the currently used polyester resin, a sole source item, were measured. Two other resins were then obtained for evaluation as possible alternates to the original resin. Even though there are significant chemical differences, both resins appear to be acceptable for this application. One resin has somewhat longer gel times than desired, but this could possibly be remedied by lowering the inhibitor content slightly. Preparation of test pads would be the next step in the resin evaluation. Author (GRA)

N83-25887# System Planning Corp., Arlington, Va.
A WORKING PAPER: SOVIET DEVELOPMENTS IN REGARD TO SUPERPLASTICITY IN CERAMIC MATERIALS
William L. Frankhouser Sep. 1982 21 p refs
(Contract MDA903-82-C-0025; ARPA Order 4396)
(AD-A123186; SPC-849; SPC-83-0010) Avail: NTIS HC A02/MF A01 CSCL 20/11

This document presents the results of a review of recent literature on the superplasticity phenomenon in ceramic materials and an assessment of relevant Soviet technology development. Author (GRA)

N83-25888# Vermont Univ., Burlington. Dept. of Chemistry.
ORGANOFUNCTIONAL PHOSPHAZENES AND ORGANOFUNCTIONAL PHOSPHAZENE POLYMERS
Christopher W. Allen 3 Feb. 1983 23 p refs Submitted for publication
(Contract N00014-77-C-0605; NR Proj. 356-663)
(AD-A124499; TR-13) Avail: NTIS HC A02/MF A01 CSCL 07/3

Recent work has shown that the range of synthesis of new and useful phosphazene derivatives can be dramatically expanded by incorporation of an organo-functional substituent on the phasphazene ring. This substituent can serve as the site for various synthetic transformations leading to new monomeric and polymeric phosphazene moieties. Initial work on propenylphosphazenes and their copolymerization with organic monomers will be briefly discussed. In addition to electron rich olefins such as alkoxylvinylphosphazenes, novel alkynlphosphazene/styrene copolymers have been prepared. The vinyl alcohol derivative, N3P3Cl5OCH=CH2 and related compounds have been prepared and characterized. Both homopolymerization and a broad range of copolymerization reactions of N3P3Cl5OCH=CH2 will be presented. The properties of these systems can be modified by reactions of the cyclophosphazene units in the polymer. Author (GRA)

N83-25889# Johns Hopkins Univ., Baltimore, Md. Dept. of Chemistry.
QUANTUM CHEMICAL INVESTIGATIONS OF THE MECHANISM OF CATIONIC POLYMERIZATION AND THEORETICAL PREDICTION OF CRYSTAL DENSITIES AND DECOMPOSITION PATHWAYS OF ENERGETIC MOLECULES Annual Summary Report, 1 Oct. 1981 - 30 Sep. 1982
Joyce J. Kaufman 25 Oct. 1982 88 p refs Sponsored in part by the Dept. of the Army
(Contract N00014-80-C-0003; NR Proj. 093-064)
(AD-A123728; TR-3; ASR-3) Avail: NTIS HC A05/MF A01 CSCL 20/10

Ab-initio quantum chemical investigations of the mechanism of cationic polymerization; development, implementation testing of theoretical procedures for prediction of crystal structures and densities; ab-initio quantum chemical MODPOT/VRDDO/MERGE

calculations on nitroexplosives, including polynitropolyhedranes; and decomposition pathways of energetic compounds. Quantum chemical calculations on the large molecules have been carried out with our own programs which also incorporate several desirable options for ab-initio calculations on large molecules. We have devoted attention to implementing new computational strategies for the large CI programs to handle large molecules effectively. We are also deriving and implementing a new approach to many-body theory based on multi-determinant reference states and an iterative procedure. GRA

N83-25890# Lehigh Univ., Bethlehem, Pa.
THE APPLICATION OF INFRARED MICROSCOPY IN THE STUDY OF POLYMER FATIGUE
M. T. Hahn, Richard W. Hertzberg, Reinhold W. Lang, John A. Manson, and J. C. Michel Dec. 1982 11 p refs
(Contracts N00014-77-C-0633; N00014-77-C-1234)
(AD-A124142; TR-16) Avail: NTIS HC A02/MF A01 CSCL 07/4

A model describing the frequency sensitivity of fatigue crack propagation (FCP) of polymers in terms of localized versus generalized specimen heating is examined. The magnitude of heating at the crack tip and across the unbroken ligament of the specimen is measured with an infrared microscope. The results confirm the earlier hypothesis regarding the observed frequency dependence of FCP behavior. Author (GRA)

N83-25891# Lehigh Univ., Bethlehem, Pa.
EFFECTS OF SHORT GLASS FIBERS AND PARTICULATE FILLERS ON FATIGUE CRACK PROPAGATION IN POLYAMIDES
Reinhold W. Lang, John A. Manson, and Richard W. Hertzberg Dec. 1982 30 p refs
(Contracts N00014-77-C-0633; N00014-77-C-1234)
(AD-A124140; TR-12) Avail: NTIS HC A03/MF A01 CSCL 11/2

The fatigue crack propagation (FCP) behavior (at 10 Hz) of several commercial short-glass-fiber and mineral-reinforced nylon composites has been investigated. The FCP rates can be described in terms of the well known Paris relationship. Significant improvement in FCP performance was found for the glass-fiber-reinforced materials in comparison to that of the pure matrix materials (nylon 66 and nylon 612). Also, the FCP resistance was found to increase with increasing fiber content and interfacial adhesion for nylon 66. Despite the fact that specimens were cut from injection-molded plaques, no or only slight effects of orientation were observed by testing specimens with cracks growing parallel and perpendicular, respectively, to the major flow direction. GRA

N83-25892# Rockwell International Corp., Thousand Oaks, Calif. Science Center.
STUDY PROCESSING OF CERAMIC MATERIAL Progress Report, Apr. 1982 - Jan. 1983
F. F. Lange Jan. 1983 36 p refs
(Contract N00014-82-C-0341)
(AD-A124128; SC5325.1PR; PR-1) Avail: NTIS HC A03/MF A01 CSCL 11/2

A concept is presented which relates the sinterability of a powder compact to its particle arrangement as defined by the distribution of pore coordination numbers, i.e., the number of touching particles surrounding and defining each void space. Previous thermodynamic arguments suggest that pores will only disappear when their coordination number is less than a critical value. The coordination number distribution of an agglomerated powder is discussed with respect to the size of the multiple-particle packing unit, consolidation forces and phenomena develop during sintering. One pertinent conclusion is that the multiple-particle packing units, density and support grain growth as sintering initiates. Grain growth and rearrangement processes decreases the coordination number of remaining pores to allow them to disappear during latter states of sintering. Porosimetry and direct observations of powder compacts of < 1 micron Al2O3 heat treated between 600 and 1600 C are consistent with this concept. GRA

N83-25893# Martin Marietta Labs., Baltimore, Md.
BONDABILITY OF TI ADHERENDS. PART 3: OXIDE STABILITY AND SUBSTRATE CORROSION Final Report, 15 Aug. 1981 - 15 Aug. 1982
Manachem Natan and John D. Venables Sep. 1982 49 p refs
(Contract N00019-81-C-0355)
(AD-A123995; MML-TR-82-20C) Avail: NTIS HC A03/MF A01 CSCL 11/1

As the last part of a three-year program designed to evaluate surface pretreatments of titanium for adhesive bonding, this study concentrated on the effect of oxide stability on bond durability. We found that if the oxide is amorphous and highly defective, it will be susceptible to morphological and structural changes. The bond to epoxy, which probably involves only the uppermost atomic layer of the oxide, may be disrupted by surface migration and crystallization in the oxide and by processes leading to the base metal corrosion in water. These mechanisms are known to be highly temperature sensitive and are probably accelerated in the presence of water. The use of Auger electron spectroscopy and sputter profiling for studying oxide transformations is also illustrated. GRA

N83-25894# Illinois Univ., Urbana. Dept. of Ceramic Engineering.
EFFECT OF COPRECIPITATION PARAMETERS ON POWDER CHARACTERISTICS AND ON DENSIFICATION OF PZT CERAMICS Interim Research Report, 1 Oct. 1980 - 30 Sep. 1982
R. C. Buchanan and J. Boy Sep. 1982 25 p refs
(Contract N00014-80-K-0969; Grant NSF DMR-80-20250)
(AD-A124041; TR-6) Avail: NTIS HC A02/MF A01 CSCL 20/2

Effects of coprecipitation parameters on agglomerate size distribution and XRD crystallinity of PZT (53:47) powders obtained from butoxide precursors, were studied. Parameters found to significantly affect the coprecipitation process included: dilution, pH and coprecipitation rate (controlled by H2O added to cause exothermic hydrolysis of the butoxides). Effects of rinsing the precipitates with different concentrations of isopropanol/water solutions were also investigated. Results showed that relative agglomerate size distributions developed during coprecipitation persisted throughout subsequent processing. Sintered densities and microstructures were correlated to the agglomerate size distributions. Most compact and uniform microstructure were obtained with uniform (and smaller) agglomerate distributions and 60/40 isopropanol/water rinsing. Author (GRA)

N83-25895# Ballistic Research Labs., Aberdeen Proving Ground, Md.
STORED ENERGY AND PLASTIC VOLUME CHANGE
Thomas W. Wright Jan. 1983 18 p refs
(DA Proj. 1L1-61102-AH-43)
(AD-A123872; AD-F300177; ARBRL-MR-03237) Avail: NTIS HC A02/MF A01 CSCL 20/11

In this brief note it is pointed out that a relation between stored energy of plastic work and volume change, as derived by Toupin and Rivlin (1960), is borne out remarkably well in the case of four metals for which sufficient data exist in the literature. Some conditions that should enhance volume change are pointed out, and partial data for six other metals are tabulated. GRA

N83-25896# Dayton Univ., Ohio.
INFLUENCE OF PROCESSING IN THE SOLID STATE MORPHOLOGY OF ABPBI/PBT POLYMERIC COMPOSITE FILMS: X-RAY STUDIES Special Interim Report, Sep. 1980 - Jan. 1981
A. K. Kulshreshtha and G. E. Price Wright-Patterson AFB, Ohio AFWAL Nov. 1982 55 p refs
(Contract F33615-81-C-5019)
(AD-A123955; UDR-TR-82-91; AFWAL-TR-82-4133) Avail: NTIS HC A04/MF A01 CSCL 11/9

X-ray diffraction patterns of ABPBI/PBT polyblend films suggest the formation of polymer-solvent complexes at the molecular level. This effect may be misinterpreted as a new phase formed as a result of blending the two polymers. Polymer-solvent complexes are crystalline and can be oriented by usual methods. The nature

of the X-ray diagram of the polymer-solvent complex depends upon blend composition, type of solvent and the method employed for film processing (casting or quenching). Neutralizing or annealing of polyblend films (in order to eliminate the solvent) results in X-ray diffraction patterns which can be explained in terms of additive contributions from the constituent polymers, the ABPBI/PBT polyblend films thus have a two-phase morphology. Various methods for the processing of these novel polymer mixtures are presented and discussed in terms of their influence on the microstructure. Author (GRA)

N83-25897# Naval Research Lab., Washington, D. C. Chemical Diagnostic Branch.
DEVELOPMENT OF TIN-BASED ORGANOMETALLIC ANTI-FOULING COATINGS FOR NAVY USE
L. Pasternack and J. R. McDonald 23 Feb. 1983 16 p refs
(AD-A125190; NRL-MR-5054) Avail: NTIS HC A02/MF A01 CSCL 11/3

This report reviews the Navy's needs in the development to tin-based organometallic anti-fouling coatings in the context of work accomplished, work in progress, and work still to be done. Areas addressed include: (1) the determination of the most effective organotin biocides and leach rates; (2) air monitoring techniques for use in organotin painting and removal operations; and (3) the effects of organotins on harbor and coastal areas both in the aquatic environment and in sediments. Author (GRA)

N83-25898# Michigan Molecular Inst., Midlands.
X-RAY SCATTERING FROM AMORPHOUS ACRYLATE AND METHACRYLATE POLYMERS: EVIDENCE OF LOCAL ORDER Final Report, 1 Aug. 1980 - 31 Jul. 1982
R. L. Miller, R. F. boyer, and J. Heijboer (Plastics Research Inst. TNO, Delft) Dec. 1982 86 p refs
(Contract DE-AC02-80ER-10657)
(DE83-006260; DOE/ER-10657-1; MMI-Contrib-209) Avail: NTIS HC A05/MF A01

X-ray scattering patterns from amorphous polymers frequently contain halos corresponding to distances significantly greater than that of van der Waals packing of carbon atoms. Regularities in the positions of such halos as a function of pendant group size were reported, primarily for the crystallizable comb polymers. N-alkylacrylate, n-alkylmethacrylate, and cyclo-alkylmethacrylate polymers with small alkyl groups are dicussed. Regularities in halo position with alkyl group size are seen, but the behavior with size is quantitatively different than that of the comb polymers. A case is made for the existence of a moderate amount of intersegmental order as the normal condition in the condensed amorphous state. The behavior of poly(methylmethacrylate) is anomalous and studies on it may not be used to generalize about the structure of the amorphous state. DOE

N83-25899# California Univ., Livermore. Lawrence Livermore Lab.
DYNAMIC COMPACTION OF CERAMIC POWDERS
C. F. Cline 10 Jun. 1982 20 p refs Presented at 5th Intern. Meeting of Modern Ceramics Technol., Lignano-Sabbiadoro, Italy, 14 Jun. 1982
(Contract W-7405-eng-48)
(DE82-017553; UCRL-87723; CONF-820638-3) Avail: NTIS HC A02/MF A01

Dynamic consolidation is a technique for densifying powder ensembles to near theoretical with or without external application of heat. The technique itself is simple: the confined powder, initially at a green density of approximately 50% encounters a high pressure shock wave which exceeds the yield strength and densifies as the wave proceeds through the compact. The time scales and pressure range from 1-10's of microseconds and 10-100's of kilobars (10 Kb =1 GPa). The short time scale of the pressure pulse during the compaction stage inhibits kinetic processes which have longer time constants. The pressure pulse an be delivered to the green compact by a number of techniques, i.e., high explosive, projectile. The methods differ in the degree that one can control the amplitude, duration, and nature of the pressure pulse. DOE

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N83-25900# Department of Defense Explosives Safety Board, Washington, D.C.
MINUTES OF THE EXPLOSIVES SAFETY SEMINAR (20TH), VOLUME 1
Aug. 1982 949 p refs Seminar held at Norfolk, Va., 24-26 Aug. 1982
(AD-A124400) Avail: NTIS HC A99/MF A01 CSCL 19/1

The objective of our explosives safety program is to provide maximum protection against injury to personnel and damage to property consistent with operational requirements. Toward this end our goals are: to eliminate unnecessary risks to life and property from the harmful effects of accidents; to make safety an essential consideration in all facilities and operations planning; to insure that safety is a total life-cycle consideration for ammunition and explosives; and to eliminate deviations from ammunition and explosives safety standards that are not essential or are not justified on the basis that the increased risks are insignificant in comparison with the cost of achieving compliance. GRA

N83-25901# Department of Defense Explosives Safety Board, Alexandria, Va.
MINUTES OF THE 20TH EXPLOSIVES SAFETY SEMINAR, VOLUME 2
Aug. 1982 988 p refs Seminar held at Norfolk, Va., 24-26 Aug. 1982 2 Vol.
(AD-A124401) Avail: NTIS HC A99/MF A01 CSCL 19/1

Contents include: (1) explosion resistant structures design; (2) ammunition test methods and equipment; (3) propagation and fragment hazards; (4) explosives development; (5) explosions in underground magazines; (6) debris dispersal from explosions; (7) explosives sensitivity testing and banking; (8) chemical agent standards; (9) personnel vulnerability to blast and fragments; (10) training, safety and health programs in the workplace; (11) explosive equivalence; (12) explosive accidents; (13) detection and decontamination; and (14) hardened aircraft shelters. GRA

N83-25902# Orlando Technology, Inc., Shalimar, Fla.
HYDROCODE CALCULATIONS OF HIGH LENGTH-TO-DIAMETER CYLINDRICAL EXPLOSIONS IN SAND Final Report, May - Jun. 1981
John J. Osborn Eglin AFB, Fla. AFATL Feb. 1982 72 p refs Prepared in cooperation with DATATEC, Inc., Ft. Walton Beach, Fla.
(Contract F08635-81-C-0050; AF Proj. 2543)
(AD-A123858; AD-E800667; AFATL-TR-82-10) Avail: NTIS HC A04/MF A01 CSCL 19/4

This document presents wave propagation computer code (hydrocode) calculations of infinitely long Composition B explosive cylinders detonated in a dry, highly porous, sand medium. Scaled free-field pressure and pressure impulse predictions are presented along with reflected pressures. GRA

N83-25903# Naval Surface Weapons Center, White Oak, Md. Energetic Materials Div.
A MIXED REGRESSION MODEL FOR THE ANALYSIS OF EXPLOSIVES PERFORMANCE DATA Interim Report
William W. McDonald 30 Jul. 1982 98 p refs
(SD33354391)
(AD-A125337; AD-F500124; NSWC/TR-82-74) Avail: NTIS HC A05/MF A01 CSCL 19/4

An intra-class regression model with additive error terms consisting of a gage calibration error, a within-class performance variation, and a general experimental error is developed for the analysis of explosives performance data associated with the shock waves of underwater explosions. Parameter estimates for this mixed model are sought by means of the maximum likelihood and restricted maximum likelihood techniques. Derivatives of the likelihood function suitable for constrained Newton-Raphson optimization are derived. Useful applications are discussed. GRA

N83-25904# Southwest Research Inst., San Antonio, Tex. Fuels and Lubricants Research Lab.
EMERGENCY FUELS TECHNOLOGY Interim Report, May 1981 - Jun. 1982
J. N. Bowden and L. I. Stavinoha Jun. 1982 84 p refs
(Contracts DAAK70-80-C-0001; DAAK70-82-C-0001; DA Proj. 1L7-72733-AH-20)
(AD-A125275; AFLRL-155; SWRI-6800-129) Avail: NTIS HC A05/MF A01 CSCL 21/4

Different types of engines in the military system require specific fuels for normal operation. Spark-ignition engines require gasoline, compression-ignition engines and ground gas turbine engines require diesel fuel. The requirements of each engine type are listed in Army Regulation 703-1 as primary, alternate and emergency fuels. The work reported here identifies other combustible liquids that, in extreme emergency scenarios, could be used as field emergency fuels (FEF), either as extenders of the primary fuel supply, or as acquired. Correlations are presented that permit estimating the fuel blend properties considered to be crucial for operation of engines at a minimal performance level.
Author (GRA)

N83-25905# Southwest Research Inst., San Antonio, Tex. Energy Systems Research Div.
EVALUATION OF GASOHOL IN U.S. ARMY ADMINISTRATIVE AND TACTICAL VEHICLES Final Report, 1 Apr. 1980 - 31 Dec. 1981
John D. Tosh, Anna F. Stulsas, W. Wayne Bardaway, and Ruben Alvarez Nov. 1982 46 p
(Contract DE-AC03-79CS-50004)
(AD-A125274; SwRI-5739-1) Avail: NTIS HC A03/MF A01 CSCL 21/4

Following the passage of the Defense Authorization Act (PL96-107) U.S. Army Mobility Equipment Research and Development Command (MERADCOM) was tasked by Department of Defense to evaluate gasohol in U.S. Army vehicles. A cooperative program between MERADCOM and the Department of Energy resulted in five vehicle fleet tests at four Army installations conducting an evaluation of gasohol in administrative and tactical vehicles. A test group (gasohol) and control group (gasoline) was established in each fleet except MERADCOM, which only used a test group. There was a grand total of 104 test vehicles and 69 control vehicles in the evaluation. The test groups accumulated 496,985 miles while the control groups accumulated 378,756 miles. Two of the five installations reported no performance problems for either test or control groups. For the remaining three fleets, 17% (18 of 104) of the test vehicles and 9% (6 of 69) of the control vehicles experienced one or more performance problems. The 18 test vehicles reported 30% more problems than did the 6 control vehicles. This agrees with trends observed in the DOE Reliability Fleet Test in which gasohol-powered vehicles have a higher frequency of incidents in traffic. GRA

N83-25906# Pandalai Coatings Co., Brackenridge, Pa.
INVESTIGATIVE STUDY ON ALCOHOL DIESEL FUEL BLENDS Final Report, 1 Oct. 1980 - 30 Jun. 1981
K. Pandalai, Adel Ayoub, and B. Pandalai Jun. 1981 50 p
(Contract DAAK70-80-C-0252)
(AD-A125063) Avail: NTIS HC A03/MF A01 CSCL 21/4

The project involved characterization, storage stability and material compatibility studies of ethanol and 2 diesel fuels. Ten samples of commercially available fuels were obtained and blended with 10% ethanol which was denatured with gasolene and a solvent blend of ethyl acetate and MIBK. Anhydrous alcohol also was used to prepare a 10% blend to examine stability and material compatibility characteristics. It has been observed that the presence of small amounts of water in the alcohol causes phase separation and great care must be taken to prevent water contamination in the fuel system. It has also been found that certain surfactants and co-solvents would stabilize the fuel blends even when water is present in the blended fuels. Results of test on stability and material compatibility are presented in this report. GRA

N83-25907# Sandia Labs., Albuquerque, N. Mex. Div. 2515.
COMPARISON OF TIH SUB X- AND ZrH SUB X-KCLO-4 PYROTECHNICS
M. L. Liberman, R. S. Carlson (Mound Lab., Miamisburg, Ohio), C. T. Rittenhouse (Unidynamics/Phoenix, Inc., Ariz.), and J. W. Fronabarger (Unidynamics/Phoenix, Inc., Ariz.) 1982 16 p refs Presented at the 8th Intern. Pyrotech. Symp., Steamboat Springs, Colo., 12 Jul. 1982
(Contract DE-AC04-76DP-00789)
(DE82-015262; SAND-82-0198C; CONF-820710-6) Avail: NTIS HC A02/MF A01

Pyrotechnic properties of ZrH/sub x//KClO4 blends were compared with those previously obtained for TiH/sub x//KClO4 blends. The results indicate that the dependence of spark sensitivity on fuel microstructure found for the latter materials also exists for the former. Bridgewire ignition data for the ZrH/sub x//KClO4 blends show that the subhydrides are more sensitive than the dihydride. Results of ballistic output testing show that the ZrH/sub x//KClO4 blends yield lower outputs than those achieved with TiH/sub x//KClO4 blends. DOE

N83-25908# California Univ., Livermore. Lawrence Livermore Lab.
EROSION MECHANISMS
Alfred C. Buckingham, Wigbert J. Siekhaus, and Clifford W. Price 12 Jul. 1982 20 p refs Presented at the 29th Ann. Sagamore Army Mater. Res. Conf., Lake Placid, N.Y., 19-23 Jul. 1982
(Contract W-7405-eng-48)
(DE82-019242; UCRL-87824; CONF-820725-2) Avail: NTIS HC A02/MF A01

Several, apparently dominant mechanisms of hot gas flow propellant combustion erosion were isolated and partially evaluated. Several of the more distinctly isolatable mechanisms are described. Some notions are presented on techniques for countering the type of container wall erosion which generally occurs in internal combustion gas flows emanating from solid propellant hyperbolic combustion. DOE

N83-25909# Fuel and Mineral Resources, Inc., Reston, Va.
ANNOTATED REVIEW OF THE TECHNOLOGICAL STATE-OF-THE-ART OF ETHYL AND METHYL ALCOHOL-BASED FUELS AND DETERMINATION OF THE ECONOMIC FEASIBILITY OF COMMERCIAL-SCALE PRODUCTION OF SUCH FUELS
25 Aug. 1982 452 p refs
(Grant EDA-99-06-07106)
(PB83-146308; EDA-82-0060) Avail: NTIS HC A20/MF A01 CSCL 21D

This study reviews the state-of-the-art in alcohol fuels production and utilization technologies and assesses the technical and economic feasibility of commercial production of alcohol-based fuels. GRA

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N83-25910# Queensland Univ., St. Lucia (Australia). Dept. of Civil Engineering.
ELASTIC CONSOLIDATION AROUND A DEEP CIRCULAR TUNNEL
J. P. Carter and J. R. Booker Mar. 1981 42 p refs

(RR-CE22) Avail: NTIS HC A03/MF A01

A method of analysis is presented for the consolidation of a linear elastic soil due to the cutting of a long and deep circular tunnel. Solutions were obtained for the time dependent displacements and stress changes occurring in the soil surrounding the tunnel opening. S.L.

N83-25911# Science Management Corp., Washington, D.C.
FEDERAL PROCUREMENT METRICATION APPROPRIATENESS AND METHODS Final Report
Michael A. Coella 18 Sep. 1982 85 p
(AD-A123243; NRC-3581-682) Avail: NTIS HC A05/MF A01 CSCL 15/5

This study was designed to provide the USMB with a clearer understanding of the basic relationships between the Federal procurement process and private sector suppliers. This was done to gain an understanding of the ways in which Federal procurement can encourage and accommodate initiatives of the private sector and to ensure that the effects of conversion on the Federal and private sectors are understood prior to implementation of procurement decisions and actions. Author (GRA)

N83-25912# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
COLD WEATHER CONSTRUCTION MATERIALS. PART 2: FIELD VALIDATION OF LABORATORY TESTS ON REGULATED-SET CEMENT FOR COLD WEATHER CONCRETING
B. J. Houston, G. C. Hoff, and F. H. Sayles Dec. 1982 34 p refs
(Contracts IAO-CRREL-75-18; IAO-CRREL-75-27; DA Proj. 4A7-62719-AT-06)
(AD-A124526; CRREL-SR-82-29-Pt-2) Avail: NTIS HC A03/MF A01 CSCL 11/2

The Army carries on construction projects in localities where the concrete placing season is shortened considerably by the cold climate. This study evaluates regulated-set cement, which is a fast setting, rapid strength gain cement, that appeared to have great promise and would allow concrete to be placed at ambient temperatures as low as 15 F. Both mortars and concretes made with regulated-set cement were studied in the laboratory with favorable results, so the laboratory results were validated with field testing. Two 12-ft by 12-ft by 8-in. test slabs were cast in January 1975 when the mean ambient temperature was approximately 15 F. The only differences in the two slabs were the concrete mixture temperature and air entrainment. The slabs received no special protection from the ambient temperatures. Neither slab obtained any appreciable compressive strength at 1 day but slab 1 had approximately 1200 and 200 psi at 7 and 28 days, respectively, while slab 2 had 2200 and 3300 psi, respectively. The concrete in both slabs was wetter than intended. Since there was no strength gain at day 1, whereas there had been in laboratory tests of approximately the same concrete mixture but with an earlier shipment of regulated-set cement, a sample of the cement from the field test was brought to the laboratory for comparison with the cement used in the laboratory tests.
Author (GRA)

N83-25913# Southwest Research Inst., San Antonio, Tex.
EXPLOSION PREVENTION IN DRY DUST COLLECTION SYSTEMS Final Report, Jul. 1980 - Jul. 1982
J. C. Hokanson, R. J. Magott, O. Tranbarger, G. Petino (Hazards Research Corp.), and W. O. Seals (ARRADCOM) Jan. 1983 174 p refs
(Contract DAAK10-80-C-0176)
(AD-A123793; AD-E400956; ARLCD-CR-82060; SRI-02-6180) Avail: NTIS HC A08/MF A01 CSCL 19/4

To reduce the risk of dust explosions in propellant and explosive manufacturing plants, dust is captured as it is generated and transported through ducts to filters, separators, or collectors. However, the dust collection systems may potentially contribute to the accident potential within the plant. A series of site visits was made to measure the electrostatic potential buildup and the dust concentration levels in ducting actually present during normal plant operations. These data provide a base of plant operating conditions upon which one may evaluate the safety of dry dust collection systems. A survey was conducted to determine if off-the-shelf instrumentation exists which will measure dust concentrations dynamically at levels within the explosive range. Most dust explosive characterizations are conducted using the Hartmann apparatus. This instrument is useful for evaluating relative characteristics of dusts. However, it has been shown that this instrument underpredicts both the peak pressure and the pressure rise rate for full-scale explosions. In designing explosion venting or explosion-resistant structures, data obtained in larger chambers are needed to allow the prediction of full-scale trends. A series of experiments was conducted using 40 and 1000 liter vessels to characterize the peak pressure and pressure rise rate for several explosive dusts. GRA

N83-25914# Lincoln Lab., Mass. Inst. of Tech., Lexington.
SAFETY-INSPECTION GUIDELINES FOR PHOTOVOLTAIC RESIDENCES
S. E. Forman and D. N. Klein Jan. 1982 43 p refs
(Contract DE-AC02-76ET-20279)
(DE82-017235; DOE/ET-20279/195) Avail: NTIS HC A03/MF A01

A set of interim inspection guidelines is given to assess the safety of a residential PV system until more formal documentation is available from code-generating groups. The guidelines address the electrical and mechanical installation. DOE

N83-25915# Oak Ridge Y-12 Plant, Tenn. Fabrication Systems Dept.
DIAMOND TURNING OF STEEL IN A CARBON-SATURATED ATMOSPHERE
J. M. Casstevens 2 Jun. 1982 33 p refs Presented at a Workshop on Precision Machining Soc. of Manuf. Engr., St. Paul, Minn. 6 Jun. 1982
(Contract W-7405-eng-26)
(DE82-019811; Y/DX-423; CONF-820641-2) Avail: NTIS HC A03/MF A01

The wear of diamond tools when machining steels under carbon dioxide and methane gases is investigated. It is shown that diamond tool wear on steels appears to be significantly reduced due to the effects of the methane gas atmosphere. Applicable literature is reviewed and an explanation for the effectiveness of a gas rich in carbon is given. A description of the experimental apparatus and procedure is given along with results of experiments with two types of steel. DOE

N83-25916# Kansas Univ., Lawrence. Dept. of Civil Engineering.
GRID SIZE EFFECTS WITH SMEARED CRACKING IN FINITE ELEMENT ANALYSIS OF REINFORCED CONCRETE
R. H. Dodds, D. Darwin, J. L. Smith, and L. D. Leibengood Aug. 1982 129 p refs
(Grant NSF PFR-79-24696)
(PB83-144576; SM-6; NSF/CEE-82034) Avail: NTIS HC A07/MF A01 CSCL 13C

The effects of modeling parameters on the response of finite element representations of reinforced concrete members are examined. The convergence of load deflection curves and cracking patterns is studied. Nonlinear behavior is limited to cracking of the concrete and yielding of the reinforcement. The smeared crack representation is governed by a limiting tensile stress criterion. Concrete is treated as linear elastic in compression. Reinforcement has a bilinear stress-strain curve. Constant strain bar elements and rectangular isoparametric elements model the steel and concrete, respectively. Analyses are performed for flexural members under both a uniformly distributed load and a concentrated load at midspan, using a minimum of three variations in grid refinement. GRA

N83-25917# Oklahoma Dept. of Transportation, Oklahoma City.
POLYMER CONCRETE OVERLAY ON SH-51, BRIDGE DECK
Tim M. Borg Jun. 1982 70 p refs

(Contract DOT-FH-11-9124)
(PB83-137935; Rept-80-03-1-2409) Avail: NTIS HC A04/MF A01 CSCL 13B

A thin resinous overlay was placed on a sound bridge deck in Oklahoma to evaluate its performance over one year using various physical tests. The evaluation shows how well the overlay protects the reinforcing steel from corrosion due to deicing salts. The steps leading to the construction of the overlay are detailed as well as the actual placing of the overlay. The results of various physical tests are reported for both before and after the overlay. GRA

N83-25918# Texas Transportation Inst., College Station.
DESIGN OF OPEN GRADED FRICTION COURSES WITH SULFUR EXTENDED ASPHALT BINDERS Final Report, May 1979 - May 1981
D. Saylak, K. K. Ho, Bob M. Gallaway, and D. N. Little Sep. 1982 214 p refs
(Contract DOT-FH-11-9588)
(PB83-139402; FHWA/RD-83/053) Avail: NTIS HC A10/MF A01 CSCL 13C

The combination of the anticipated shortage of asphalt cement and the projected abundance of sulfur has led to the investigation of the potential for substituting this element for the former in the paving industry. Sulfur was incorporated with asphalt to form sulfur-extended asphalt (SEA) binders for use in open graded friction course mixtures. The experimental design variable included aggregated type, asphalt cement, level of sulfur contents in the binder and method of preparing SEA binders. GRA

N83-25919# Transportation Research and Marketing, Salt Lake City, Utah.
TRANSPORTATION ENERGY CONSERVATION THROUGH LAND USE PLANNING
Jun. 1982 58 p refs Conf. held in Washington, D.C., 5-6 Nov. 1981 Sponsored in part by the FHA
(PB83-148387; DOT-1-82-50) Avail: NTIS HC A04/MF A01 CSCL 13B

The interrelationships of transportation, land use and energy are covered. Two major areas were highlighted; the fundamental social, economic, energy, and cultural factors that influence planning, and opportunities for the coordination of transportation and land use. Although no specific recommendations are contained, highlight examples of effective plans and programs and questions that can form the basis for further research are described. GRA

N83-25920# Utah Dept. of Transportation, Salt Lake City. Materials and Research Section.
IMPROVEMENT OF PAVEMENT RIDEABILITY IN UTAH Final Report
Jeffrey A. Long, Michael C. Belangie, and Douglas I. Anderson Aug. 1982 71 p refs Sponsored in cooperation with Federal Highway Administration
(PB83-147314; UDOT-MR-82-1; FHWA/UT-81/1) Avail: NTIS HC A04/MF A01 CSCL 13B

Ways to improve the rideability of Utah roads by (1) increasing the effectiveness of present methods and (2) applying new methods using available surface quality measuring equipment were determined. It is recommended that the Mays Ride Meter be used as a pavement roughness survey tool to evaluate deteriorated pavements programmed for rehabilitation or major maintenance. This would identify rough pavement areas that should be considered for lane leveling or planing prior to an overlay or other activity. GRA

N83-25921# Calspan Corp., Buffalo, N. Y.
AERIAL MEASUREMENT OF HEAT LOSS, PHASE 2
John Schott and Elizabeth Wilkinson Jul. 1982 175 p refs
(Contract DE-AC02-78CS-20415)
(PB83-139386; ORNL/SUB-9001-1; NYSERDA-82-7) Avail: NTIS HC A08/MF A01 CSCL 13M

The feasibility of using aerial infrared thermography to determine building rooftop heat loss was assessed. Phase 1 of the project developed and demonstrated techniques, accurate to within 1 C, for determining rooftop temperatures by aerial thermography. Phase 2 was directed at developing a technique to determine heat loss levels from roof surface temperature data. Results of Phase 2 indicate that aerial thermography can be used to define heat loss levels from building roofs, pinpointing high heat loss houses with a great deal of accuracy. Using remote means to identify buildings or parts of buildings with high heat losses can greatly facilitate conservation efforts in the building sector. The techniques developed may provide needed direction for energy conservation programs, in addition to stimulating consumer interest in such programs. GRA

N83-25922# Westinghouse Electric Corp., Pittsburgh, Pa.
ADAPTABLE-PROGRAMMABLE ASSEMBLY RESEARCH TECHNOLOGY TRANSFER TO INDUSTRY, PHASE 2 Annual Report
N. Captor, B. Miller, B. D. Ottinger, A. J. Riggs, L. M. Tomko, and M. C. Culver Apr. 1982 100 p
(Grant NSF ISP-78-18773)
(PB83-144543; NSF/ISI-82008) Avail: NTIS HC A05/MF A01 CSCL 13H

The development of an adaptable-programmable assembly system (APAS) that was designed to automate batch assembly is discussed. The pilot APAS endbell system is a closed loop assembly line approximately 35 feet long and 6 feet wide. It consists of six stations organized around a power-and-free buffered conveyor, which moves endbelts through the stations at the rate of one every 10 to 15 seconds. Seven different styles of endbells can be processed with a total of 18 different parts and 2 lubricants. Appendixes contain pressing force measurements and a description of the operation of a numa-logic programmable controller. GRA

N83-25923# Queensland Univ., Brisbane (Australia). Dept. of Civil Engineering.
TIME DEPENDENT DEFORMATION IN PRESTRESSED CONCRETE GIRDER: MEASUREMENT AND PREDICTION
Y. J. Sokal and P. Tyrer (Leighton Contractors, Pty. Ltd.) Nov. 1981 53 p refs
(PB83-148890; RR-CE30) Avail: NTIS HC A04/MF A01 CSCL 13C

Prestressed concrete girders which are intended for composite construction in bridges and other similar structures are often stored unloaded for some time before being placed in their final positions where top deck is being poured over. During that free storage the girders are subjected to creep and shrinkage which manifests itself through increased upward deformation usually defined as camber. The analytical estimation of this deformation is important as it controls the minimum thickness of the top deck. An attempt was made to correlate on site measurements with continuous computer modeling of the time-dependent behavior using data from recently adopted international standard for concrete structures. GRA

N83-25924# New York State Dept. of Transportation, Albany. Engineering Research and Development Bureau.
OPEN FRICTION COURSES ON AN ASPHALTIC CONCRETE BASE: A SEVEN-YEAR PROGRESS REPORT Interim Progress Report
Kenneth S. Dodge Oct. 1982 30 p refs
(Contract HPR-FCP-40M2-954; FAA Proj. 149-1)
(PB83-146894; RR-98; FHWA/NY/RR-82/98) Avail: NTIS HC A03/MF A01 CSCL 13C

The performance of two open-friction courses (OFC) having 1/2 in. and 1/4 in. maximum-sized aggregates - and their adjacent conventional New York State 1A top-course (control) is documented over the final 4 years of their 7-year design lives. The pavements were evaluated by analysis of mix properties and surface performance. The physical properties examined by means of extracted pavement cores were aggregate gradation, binder penetration and viscosities, and void content. Testing of frictional performance, rut depths, microtecture and macrotexture, rideability, and cracking were used to evaluate the pavement's surface performance. GRA

N83-25925# National Bureau of Standards, Washington, D.C.
SPECIFICATIONS, TOLERANCES AND OTHER TECHNICAL REQUIREMENTS FOR WEIGHING AND MEASURING DEVICES
Otto K. Warnlof Sep. 1982 219 p refs
(PB83-138420; NBS-HB-44-1983) Avail: NTIS HC A10/MF A01 CSCL 14B

Handbook 44 was first published in 1949, having been preceded by similar handbooks of various designations and in several forms, beginning in 1918. This 1983 edition was developed by the Committee on Specifications and Tolerances of the National Conference on Weights and Measures, with the assistance of the Office of Weights and Measures of the National Bureau of Standards. It includes amendments adopted by the 67th National Conference on Weights and Measures during its annual meeting in 1982. Handbook 44 is published in its entirety each year following the annual meeting of the National Conference on Weights and Measures. GRA

N83-25926# National Bureau of Standards, Washington, D.C. National Engineering Lab.
LABORATORY TESTS OF A RESIDENTIAL UNITARY WATER-SOURCE HEAT PUMP
William J. Mulroy and George E. Kelly Nov. 1982 45 p refs Sponsored in part by DOE
(PB83-137141; NBSIR-81-2287) Avail: NTIS HC A03/MF A01 CSCL 13M

The performance of a residential heat pump was measured in the laboratory over a broad range of source water temperatures (40 F to 90 F). Tests were performed in both heating and cooling operational modes and for both steady state and cyclic operation. For both heating and cooling operations, the unit capacity and coefficient of performance were found to be linear functions of the average of the unit source and outlet water temperatures. In heating, the unit capacity, COP, and part load performance increased with increasing water temperature. In cooling, the unit capacity, COP, and part load performance decreased with increasing water temperature. The measured degradation coefficients ranged from 0.09 to 0.21 for heating and from 0.10 to 0.18 for cooling. GRA

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N83-25927 Royal Signals and Radar Establishment, Malvern (England).
SERVOSYSTEM FOR THE ATHERMALIZATION OF A GERMANIUM LENS
I. C. Carmichael and J. D. Roberts Nov. 1982 16 p refs
(RSRE-MEMO-3527; BR87081) Copyright. Avail: Issuing Activity

A simple electronically controlled servosystem developed to athermalize the germanium lens of a radiometer operating in the infrared waveband is described. The system athermalization is demonstrated, with the result that the radiometer signal is held to within 95% of maximum for a + or - 20 C lens temperature change; this compares with a signal loss of over 90% with no athermalization. Author (ESA)

N83-25928 British Aerospace Dynamics Group, Stevenage (England). New Project Studies.
THE EOSAEL 80: A USERS' GUIDE
J. E. Hancock Jan. 1982 87 p refs
(BAe-ST-25988) Avail: Issuing Activity

The use of the general purpose atmospheric optics modeling program, EOSAEL 80, (Electro Optical Systems Atmospheric Effects Library) is described. EOSAEL 80 was designed by the Atmospheric Sciences Laboratory, White Sands Missile Range, New Mexico. It allows transmission estimates to be made in a wide variety of situations including through smoke, dust and natural clouds. The EOSAEL 80's capabilities and limitations are explained, introducing the user to the main assumptions made in the models and making the user aware of exactly what information he needs to have at hand in order to run EOSAEL 80. Examples of test runs and of typical results that can be obtained from EOSAEL 80 are provided. Author (ESA)

N83-25929# National Severe Storms Lab., Norman, Okla.
SCANNING STRATEGIES FOR NEXT GENERATION WEATHER RADARS. A STUDY BASED ON LIFETIMES OF CONVECTIVE ATMOSPHERIC PHENOMENA HAZARDOUS TO AVIATION Final Report
P. R. Mahapatra and D. S. Zrnic Jul. 1982 94 p refs
(Contract DTFA01-80-Y-10524)
(FAA-RD-82-69) Avail: NTIS HC A05/MF A01

The lifetimes of significant features in typical storm phenomena were investigated and the results are expected to help in deciding the scan strategy of NEXRAD radars. In particular, the question of the adequacy of a 5 minute information update rate for NEXRAD in its aviation weather surveillance role was addressed. Two methods are used for the lifetime study: photo-interpretive and computer based correlation. The basis and program steps of the correlation method are discussed. Several storms are studied using both methods. It is found that the storms studied contain no feature that might have been missed by a 5 minute scan cycle provided that data from all the three moment fields (reflectivity, radial velocity, and Doppler spectrum width) at several elevations are utilized in the detection of hazardous phenomena. Author

N83-25930# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
SCATTERING OF CYLINDRICAL ELECTRIC FIELD WAVES FROM AN ELLIPTICAL DIELECTRIC CYLINDRICAL SHELL M.S. Thesis
Edward Arthur Urbanik Dec. 1982 137 p refs
(AD-A124683; AFIT/GE/EE/82D-67) Avail: NTIS HC A07/MF A01 CSCL 20/14

This thesis examines the scattering of cylindrical waves by large dielectric scatterers of elliptic cross section. The solution method was the method of moments using a Galerkin approach. Sinusoidal basis and testing functions were used resulting in a higher convergence rate. The higher rate of convergence made it possible for the program to run on the Aeronautical Systems Division's CYBER computers without any special storage methods. This report includes discussion on moment methods, solution of integral equations, and the relationship between the electric field and the source region or self cell singularity. Since the program produced unacceptable run times, no results are contained herein. The importance of this work is the evaluation of the practicality of moment methods using standard techniques. The long run times for a mid-sized scatterer demonstrate the impracticality of moment methods for dielectrics using standard techniques. Author (GRA)

N83-25931# Air Force Geophysics Lab., Hanscom AFB, Mass. Meteorology Div.
A 10 cm DUAL FREQUENCY DOPPLER WEATHER RADAR. PART 2: A QUALITY ASSURANCE/FAULT LOCATION NETWORK Final Report
Kenneth J. Banis 25 Oct. 1982 32 p
(AD-A125886; AFGL-TR-82-0221(2); IP-313(2)) Avail: NTIS HC A03/MF A01 CSCL 17/9

A functional description of an automatic radar system performance monitoring network is presented. A network of microprocessor controlled monitoring units as interfaced to various sensors at key areas in a Doppler weather radar in order in order to collect system status information and display it at a central point near the operator's console. This status information is displayed on a color terminal in a way that allows the systems operator to verify the proper operation of the radar with just a cursory glance at the terminal. Fault location and fault tolerant techniques were employed to provide the system user with quality assured data. GRA

N83-25932# Air Force Geophysics Lab., Hanscom AFB, Mass. Meteorology Div.
A 10 cm DUAL FREQUENCY DOPPLER WEATHER RADAR. PART 1: THE RADAR SYSTEM Final Report
Alexander W. Bishop and Graham M. Armstrong 25 Oct. 1982 42 p refs
(AD-A125885; AFGL-TR-82-0321(1); IP-313(1)) Avail: NTIS HC A03/MF A01 CSCL 12/1

Design concepts and test results are summarized for a Doppler weather radar system suitable for precipitation measurements over a wide span of radial velocities and slant ranges, even in the presence of ground clutter. The radar transmits two uniform pulse trains at 2.710 and 2.760 GHz. Uniformly spaced pulses permit ground clutter cancellation of up to 50 dB to be achieved with a three-pole elliptic filter. Pulse spacing at one frequency is consistent with long-range coverage in reflectivity, while spacing of the second is consistent with a wide unambiguous velocity measurement span. Author

N83-25933# Illinois Univ., Urbana. Coordinated Science Lab.
ITERATIVE TIME-LIMITED SIGNAL RESTORATION
Jorge L. C. Sanz and Thomas S. Huang Sep. 1982 112 p refs (Contract N00014-79-C-0424)
(AD-A124711; R-972; UILU-ENG-82-2238) Avail: NTIS HC A06/MF A01 CSCL 12/1

This technical report deals with signal restoration and extrapolation. First, we prove that time-limited deconvolution and time-limited time-variant linear restoration of multidimensional signals can be done by means of fixed-point solutions of contraction mappings. Then, the band-limited multi-dimensional signal extrapolation problem is studied. (1) We provide several new algorithms for solving the discrete extrapolation problem and show the convergence of the discrete solutions so obtained to the continuous extrapolation. (2) We propose four basic models for the extrapolation problem and we present some new techniques for solving the continuous extrapolation problem when the known part of the signal is contaminated with noise. (3) Several results concerning iterative algorithms for band-limited extrapolation are presented. Author (GRA)

N83-25934# Houston Univ., Tex. Dept. of Electrical Engineering.
THE REMOTE LINK UNIT: A DEMONSTRATION OF OPERATIONAL PERFORMANCE. PART 3: DESIGN MANUAL, VOLUME 1 Final Report, 1 Apr. - 31 Dec. 1980
Carlos J. Tavora, John R. Glover, Jr., Miles A. Smither, H. Mitchell Collins, and William C. Law Wright-Patterson AFB, Ohio AFWAL Aug. 1981 230 p refs 2 Vol.
(Contract F33615-80-C-1095; AF Proj. 2003)
(AD-A124621; AFWAL-TR-81-1131-Pt-3-Vol-1) Avail: NTIS HC A11/MF A01 CSCL 17/2

This document is a design manual for the Remote Link Unit Demonstration System (RLUDS). The Remote Link Unit (RLU) is a new design concept for remote terminals. This document contains detailed design information on the RLUDS. The RLUDS described in this design manual is an operational hardware breadboard prototype that performs most of the important RLU functions. This effort has demonstrated the feasibility of implementation of the Link Module (LM), the Interface Configuration Adapter (ICA), the Electronic Nameplate (NP) and the Interface between the Link Module and the Link Manager. The Link Manager (LMG) was simulated with a PDP-11 computer. The extent of RLU implementation encompassed by the demonstration unit is illustrated. The configuration of the RLUDS is presented. GRA

N83-25935# Houston Univ., Tex. Dept. of Electrical Engineering.
THE REMOTE LINK UNIT: A DEMONSTRATION OF OPERATIONAL PERFORMANCE. PART 3: DESIGN MANUAL. VOLUME 2: APPENDICES A - C Final Report, 1 Apr. - 31 Dec. 1980
Carlos J. Tavora, John R. Glover, Jr., Miles A. Smither, H. Mitchell Collins, and William C. Law Wright-Patterson AFB, Ohio AFWAL Aug. 1981 661 p refs 2 Vol.
(Contract F33615-80-C-1095; AF Proj. 2003)
(AD-A124622; AFWAL-TR-81-1131-Pt-3-Vol-2) Avail: NTIS HC A99/MF A01 CSCL 17/2

The source code tape directory, hardware schematics, and software flow charts are presented for the remote link unit. GRA

N83-25936# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
IMPROVED SIGNAL CONTROL: AN ANALYSIS OF THE EFFECTS OF AUTOMATED GAIN CONTROL FOR OPTICAL SIGNAL DETECTION M.S. Thesis
Kirk Lee Fisher Dec. 1982 107 p refs
(AD-A124696; AFIT/GEO/EE/82D-3) Avail: NTIS HC A06/MF A01 CSCL 17/2

This paper is to analyze the effects of an automatic gain control (AGC) in an optical receiver system. The intent of using an AGC is to improve the performance of the receiver. The received signal is Manchester encoded and contains fluctuations caused by transmission attenuation. In the conversion from an optical signal to an electrical signal, the photodetector produces shot noise. The purpose of the AGC will be to amplify the photodetector signal, control signal fluctuations, reduce shot noise, and improve detection accuracy. Using this criteria, the effects of the AGC in the receiver was examined. But because of the non-linearitis associated with an AGC, an analytical analysis can not be conducted. Therefore, the receiver was simulated on the computer. This paper describes the models and algorithms used to analyze the receiver. Through the simulations, the receiver's performance with an AGC is compared to the performance without an AGC. Because of the limited time for the analysis, only three specific AGC's were examined. GRA

N83-25937# California Univ., Los Angeles. Dept. of System Science.
HF COMMUNICATION NETWORK SIGNALS USING CHANNEL EVALUATION DATA Final Technical Report, Aug. 1980 - Aug. 1981
Jim K. Omura Nov. 1981 284 p refs
(Contract N00014-80-C-0935)
(AD-A124561) Avail: NTIS HC A13/MF A01 CSCL 17/4

The performance of convolutionally coded M-ary frequency shift keyed (FSK) signals in the presence of worst case partial band noise jamming is evaluated. A large number of cases are considered including: (1) several alphabet sizes; (2) many values of diversity; (3) several coding schemes; (4) both hard and soft decision receivers; (5) jammer state known or unknown (i.e., in the former case the receiver knows whether or not each received symbol has been jammed); and (6) non-fading and Rayleigh fading channels. GRA

N83-25938# Houston Univ., Tex. Dept. of Electrical Engineering.
THE REMOTE LINK UNIT: A DEMONSTRATION OF OPERATIONAL PERFORMANCE. PART 2: USER'S MANUAL Final Report, 1 Apr. - 31 Dec. 1980
Carlos J. Tavora, John R. Glover, Jr., Miles A. Smither, H. Mitchell Collins, and William C. Law Wright-Patterson AFB, Ohio AFWAL Aug. 1981 113 p refs 2 Vol.
(Contract F33615-80-C-1095; AF Proj. 2003)
(AD-A124620; AFWAL-TR-81-1131-Pt-2) Avail: NTIS HC A06/MF A01 CSCL 17/2

The purpose of this manual is to provide a guide for the use and operation of the Remote Link Unit Demonstration System (RLUDS) without the details of the design of the system. The sections of this manual provide information on: inspection of the equipment to verify a correct physical configuration, external cable connections, procedures for operation. This manual provides all the details necessary for operations of the RLUDS, assuming the user is generally knowledgeable of the concept, purpose, and configuration of the RLU and its major components. Both background information and design details may be found in the Design Manual (Part III). GRA

N83-25939# Houston Univ., Tex. Dept. of Electrical Engineering.
THE REMOTE LINK UNIT: A DEMONSTRATION OF OPERATIONAL PERFORMANCE, PART 1 Final Summary Report, 1 Apr. - 31 Dec. 1980
Carlos J. Tavora, John R. Glover, Jr., Miles A. Smither, H. Mitchell Collins, and William C. Law Wright-Patterson AFB, Ohio AFWAL Aug. 1981 36 p refs 2 Vol.
(Contract F33615-80-C-1095; AF Proj. 2003)
(AD-A124619; AFWAL-TR-81-1131-Pt-1) Avail: NTIS HC A03/MF A01 CSCL 17/2

This report summarizes the results of the program of implementation of an RLU Demonstration System. This system allows the evaluation of the most unique parts of the RLU and has facilitated the resolution of problem areas in the RLU design. Enhancements to the RLU functional design are presented and an implementation plan for an RLU prototype is proposed. The User's Manual and the Design Manual for the system are included as Parts II and III, respectively. Author (GRA)

N83-25940# Pennsylvania State Univ., University Park. Applied Research Lab.
ASYMPTOTIC AND GEOMETRIC PROCEDURES FOR ESTIMATING CORRELATION FUNCTIONS FOR FM SIGNALS Interim Report
E. L. Titlebaum 9 Jul. 1982 37 p refs
(Contract N00024-79-C-6043)
(AD-A124594; ARL/PSU/TM-82-151) Avail: NTIS HC A03/MF A01 CSCL 12/1

Frequency Modulated (FM) signals with large time-bandwidth products are used in many areas, such as Sonar, Radar and Spread Spectrum Communications. In order to take advantage of the pulse compression properties of these signals, many of these applications require coherent or matched filter processing as the appropriate receiver. The receiver response is usually expressed in terms of the ambiguity functions for the signals involved. Although there are many types of FM signals which have pulse compression properties, their ambiguity functions can have quite different properties. For example, linear FM signals (chirp) have a single ridge with no pedestal, whereas V-chirp FM signals have two small ridges near the time-frequency origin and an additional pedestal. Thus, it is desirable to have simple and intuitive methods for evaluating these ambiguity functions. The first section of this paper uses the method of stationary phase in order to derive an asymptotic expression for the cross-correlation function for two FM (frequency modulation) signals whose instantaneous frequency curves intersect at one point in time-frequency space. Assuming slow variation in the amplitude and frequency modulation functions allows a simple geometric interpretation for the asymptotic result which is the square-root of an area measured in time-frequency space. This is shown in section two. The case for multiple intersections is discussed and shown, through an example, to depend on the relative phases of the individual contributions. This intuitive method of evaluating correlation functions explains why V-chirp and SQFM signals have pedestals in their ambiguity functions. GRA

N83-25941# Naval Postgraduate School, Monterey, Calif. Dept. of Administrative Sciences.
A COMMUNICATIONS TRAFFIC FLOW SIMULATION MODEL OF THE MESSAGE SWITCHING SYSTEM M.S. Thesis
Steven P. Wolf Oct. 1982 173 p refs
(AD-A124593) Avail: NTIS HC A08/MF A01 CSCL 17/2

A traffic flow model is designed using the General Purpose Simulation System (GPSS V) for the U.S. Coast Guard Communications Station San Francisco. The architecture of the proposed Message Switching System (MSS) is used to analyzed the flow of message traffic in the new system. This model indicates that the MSS can adequately handle traffic loads which are currently occurring or are foreseen to occur at this COMMSTA. Author (GRA)

N83-25942# Illinois Univ., Urbana. Coordinated Science Lab.
SIGNAL DETECTION IN THE PRESENCE OF WEAKLY DEPENDENT NOISE. PART 2: ROBUST DETECTION
H. Vincent Poor Dec. 1981 39 p refs
(Contract N00014-79-C-0424)
(AD-A124440; R-932-Pt-2; UILU-ENG-81-2263-Pt-2) Avail: NTIS HC A03/MF A01 CSCL 12/1

The problem of designing robust systems for detecting constant signals in the presence of weakly dependent noise with uncertain statistics is considered. A moving-average representation is used to model the dependence structure of the noise process, with the degree of dependence being parameterized by the averaging weights. Weak dependence is then modeled as the situation in which quantities depending to second or higher order on the averaging weights can be considered to be negligible. Uncertainty in the noise statistics is introduced within this framework by allowing a general type of uncertainty in the univariate statistics of the independent sequence that drives the moving average. To find robust detectors for signals in this type of weakly dependent noise environment, related results concerning robust location estimation in an analogous dependent situation are applied to modify a robust detection system for the corresponding independent-noise case. GRA

N83-25943# Illinois Univ., Urbana. Coordinated Science Lab.
MODELS FOR FREQUENCY-HOPPED SPREAD-SPECTRUM COMMUNICATIONS OVER FADING CHANNELS M.S. Thesis
Catherine Marie Keller Dec. 1982 58 p refs
(Contract N00014-79-C-0424)
(AD-A124433; UILU-ENG-82-2242; R-976) Avail: NTIS HC A04/MF A01 CSCL 17/2

The system consisting of the series connection of a frequency-hopper, channel, and frequency-dehopper is modeled as a fading channel. The effect of a detuning factor between the hopping patterns of the hopper and dehopper is investigated. Both slow-frequency-hopped and fast-frequency-hopped systems are studied for cases when the fading channel is nonselective and selective. The ability of the frequency-hopped system to overcome frequency-selective fading is considered. Limits are found on the spacing between frequency slots in order that the fading in different slots is independent. Author (GRA)

N83-25944# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
THE EFFECTS OF CONDUCTIVITY ON HIGH-RESOLUTION IMPULSE RADAR SOUNDING, ROSS ICE SHELF, ANTARCTICA
Rexford M. Morey and Austin Kovacs Dec. 1982 20 p
(Grant NSF DPP-80-04221)
(AD-A124456; CRREL-82-42) Avail: NTIS HC A02/MF A01 CSCL 08/12

A high-resolution impulse radar profiling system was evaluated for (1) detecting the existence of sea ice which coring has revealed to exist on the bottom of the Ross Ice Shelf at Site J-9; (2) detecting the preferred horizontal c-axis azimuthal direction of the sea ice crystals, using the voltage amplitude of the radar reflection from the sea ice bottom; and (3) determining the direction of the currents under an Antarctic ice shelf. A field program was conducted consisting of a surface radar survey on the Ross Ice Shelf at Site J-9 and surface and airborne radar profiling on the McMurdo ice Shelf. The CRREL impulse radar system, operating at a center frequency of either 80 MHz or 20 MHz, was unable to detect the shelf bottom at Site J-9, which drilling revealed to be 416 m below the snow surface. The radar system was used to profile the McMurdo ice Shelf both from the snow surface and from the air; a shelf thickness of about 275 m was easily detected. Theoretical considerations indicate that the bulk conductivity of the ice shelf at Site J-9 was higher than originally anticipated, and this limited the radar sounding depth to about 405 m when operating at a frequency of 20 MHz. Author (GRA)

N83-25945# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

INVESTIGATION OF BINARY ERROR PROBABILITY FOR AN INTEGRATE-AND-DUMP RECEIVER AS OUTPUT QUANTIZATION INCREASES M.S. Thesis
Bruce T. Melusen Dec. 1982 103 p refs
(AD-A124767; AFIT/GE/EE/82D-49) Avail: NTIS HC A06/MF A01 CSCL 17/2

This thesis effort focuses on direct detection optical communications systems which use receivers classified as photon counters, or integrate-and-dump receivers. These systems determine the received message estimate based upon the number of photons or counts accumulated in the specified reception time period, T. The binary error probability for integrate-and-dump receivers is developed. The combination of the optical modulator, optical channel, and optical detector is characterized as a discrete memoryless channel (DMC). Maximum a posteriori (MAP) decision criteria are developed to enable optimal post-detection processing. The effect of quantizing the output is addressed for both ideal unity gain detector and avalanche detector optical systems. Multilevel Amplitude Keying is used to calculate specific probability of error values, and the channel cutoff rate is used to investigate probability of error bounds. GRA

N83-25946# Florida Univ., Gainesville. Dept. of Electrical Engineering.
EFFECT OF NONLINEAR ARCHITECTURES ON MONOPULSE RADAR ANGLE TRACKING ACCURACY Final Report
Peyton Z. Peebles, Jr. 17 Jan. 1983 48 p refs
(Contract N00014-82-K-2008)
(AD-A124762) Avail: NTIS HC A03/MF A01 CSCL 17/9

Many monopulse angle tracking radar systems are made up using nonlinear components, such as limiters and logarithmic amplifiers. This report describes several areas of work that all relate to monopulse angle tracking radars having at least one limiter in the signal processor. In one area the detailed angle tracking accuracy was determined for a sum-and-difference amplitude monopulse system having a sum channel limiter prior to the angle error detector. The analysis utilized a general accuracy expression valid for an arbitrary angle tracking system; the expression was developed as a second area of effort. A third area of work centered on evaluating coefficients that enter into the accuracy results derived in the first-described area. A fourth work area involved computation of the accuracy of a Rhodes Class III monopulse (with two limiters); this work was incomplete at the project end and remains for future work. Author (GRA)

N83-25947# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AUTOMATED TOOLS FOR TEST AND ANALYSIS OF RADAR WARNING RECEIVER SOFTWARE M.S. Thesis
Joel R. Robertson Dec. 1982 159 p refs
(AD-A124712; AFIT/GCS/EE/82D-28) Avail: NTIS HC A08/MF A01 CSCL 17/9

The Data Extraction and Analysis System (DEAS) was designed and implemented for the Electronic Warfare Avionics Integrated Support facility at the Warner Robins Air Logistics Center. The DEAS is designed to be used with the ALR-46 Integrated Support System (ISS) to assist testing and evaluation of operational flight software. The system is written in DEC standard PASCAL.
Author (GRA)

N83-25948# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ANALYSIS OF F-16 RADAR DISCREPANCIES M.S. Thesis
Kim A. Riche Dec. 1982 44 p refs
(AD-A124749; AFIT/GE/EE/82D-56) Avail: NTIS HC A03/MF A01 CSCL 15/5

One hundred and eight aircraft were randomly selected from three USAF F-16 bases and examined. These aircraft included 63 single-seat F-16As and 45 two-seat F-16Bs and encompassed 8,525 sorties and 748 radar system write-ups. Programs supported by the Statistical Package for the Social Sciences (SPSS) were run on the data. Of the 748 discrepancies, over one-third of them occurred within three sorties of each other and half within six sorties. Sixteen percent of all aircraft which had a discrepancy within three sorties had another write-up within the next three sorties. Designated repeat/recurring write-ups represented one-third of all the instances in which the write-up separation interval was three sorties or less. This is an indication that maintenance is unable to correct equipment failures as they occur, most likely because the false alarm rate is too high and maintenance is unable to duplicate the error conditions on the ground for correct error diagnosis. GRA

N83-25949# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
EXPANSION OF THE ECLIPSE DIGITAL SIGNAL PROCESSING SYSTEM M.S. Thesis
Gordon R. Allen Dec. 1982 259 p refs
(AD-A124750; AFIT/GE/EE/82D-16) Avail: NTIS HC A12/MF A01 CSCL 09/2

A signal processing software package was generated for a Data General Eclipse S/250 minicomputer. The model 4331 A/D/A converter was utilized to perform general purpose A/D/A operations and to collect, edit, and play back speech data files. The model 130 array processor was used to perform high-speed convolution and Fourier Transform related operations. The Parks-McClellan algorithm was implemented to allow design of linear phase, impulse response filters. Self-explanatory interactive programs for data collection and filter design, together with single line commands for signal processing functions, make this a simple to operate, versatile package for digital signal processing.
Author (GRA)

N83-25950# RAND Corp., Santa Monica, Calif.
IMPLEMENTING MESSAGE SYSTEMS IN MULTILEVEL SECURE ENVIRONMENTS: PROBLEMS AND APPROACHES
Gary R. Martins and R. Stockton Gaines Jul. 1982 76 p refs
(Contract DNA001-79-C-0201)
(AD-A124525; RAND/N-1852-DNA) Avail: NTIS HC A05/MF A01 CSCL 17/2

A study of the problems of building multilevel secure message systems. The need for such systems in the government and commercial sectors is growing. Designs are strongly affected by (1) the granularity of security protection (at the level of folders, messages, paragraphs, or words) and (2) planned departures from the Bell-LaPadula security model, for user convenience. A Taxonomy of design alternatives is defined, and 16 specific approaches are described and compared. Author (GRA)

N83-25951# Communications Research Centre, Ottawa (Ontario).
CORRECTIONS FOR FREQUENCY RESPONSE DIFFERENCES IN MULTIPLE RECEIVER ARRAYS
J. L. Robinson and R. W. Jenkins Apr. 1982 17 p refs
(AD-A124511; CRC-TN-711) Avail: NTIS HC A02/MF A01 CSCL 09/5

In interference-cancelling antenna array systems where the signals are combined after passing through receivers, the differential frequency responses of the receivers act to limit the null depth and therefore the degree of interference rejection attainable for finite-bandwidth interference. An experimental four-element HF antenna array is used as an illustration; the measured differential frequency dependent phase and amplitude responses of the receivers are presented and the corresponding limits to null-depth derived, for a 3 KHz bandwidth. Correction techniques, including an exact software procedure and a hardware-implementable approach to linear phase correction are presented, and their requirements and anticipated performance considered.
Author (GRA)

N83-25952# Harry Diamond Labs., Adelphi, Md.
A COMPARISON OF TRANSIENT-RADIATION EFFECTS VULNERABILITY ANALYSIS WITH EXPERIMENTAL RESULTS Progress Report
Paul A. Trimmer Dec. 1982 29 p refs
(DA Proj. 1L1-62120-AH-25)
(AD-A124575; HDL-PR-82-1) Avail: NTIS HC A03/MF A01 CSCL 18/6

A low-cost analytical method has been used by the Harry Diamond Laboratories for the past several years to assess the response of U.S. Army electronic equipment to transient-radiation effects (TRE). A series of experiments was designed to test several assumptions inherent in the methodology. GRA

N83-25953# Illinois Univ., Urbana. Coordinated Science Lab.
RANDOM-ACCESS TECHNIQUES FOR COMMUNICATION NETWORKS WITH SPREAD-SPECTRUM SIGNALING Final Report, 21 Aug. 1981 - 20 Aug. 1982
Bruce Hajek Sep. 1982 67 p refs
(Contract N00014-80-C-0802)
(AD-A124567; UILU-ENG-82-2225; R-959) Avail: NTIS HC A04/MF A01 CSCL 17/2

This report briefly summarizes progress made during the past year. The emphasis is on results which are applicable to the Navy's proposed intratask-force (ITF) communication network. One goal of our research was to study basic random access strategies. An important feature was to consider buffered stations and to allow the packet arrival rates at the different stations to independently fluctuate. The rate fluctuation leads to more bursty traffic than the usual Poisson or Bernoulli arrival models. Much to our surprise, even for rather bursty models the time division multiple access (TDMA) strategy produces delays which are not much larger than the ideal (but unrealizable) perfect scheduling strategy. As a result, we shifted more attention to considering how a network wide TDMA strategy might be implemented using spread-spectrum signaling. We sought a strategy which incorporates the multiple-access capability of spread-spectrum signaling. The result is a procedure controlling multiple access interference in a scheduled spread-spectrum network. The procedure is compatible with existing link activation scheduling algorithms which are not designed to control such interference. GRA

N83-25954# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
WAVE ABSORPTION MATERIALS USED IN CONCEALMENT TECHNIQUE
Liu Junneng 13 Jan. 1983 11 p Transl. into ENGLISH from Guoji Hangkong (China), no. 9(235), Sep. 1982 p 52-53
(AD-A124755; FTD-ID(RS)T-1602-82) Avail: NTIS HC A02/MF A01 CSCL 17/4

The concealment technique is a comprehensive technique. In other words, the aircraft model is designed based on a system engineering concept in which the aircraft has low detectability to an electromagnetic system, infrared system, or other electro-acoustic detection on systems. This technique includes design and layout of a special exterior of the airplane structure, application of electromagnetic wave absorption materials, the technique of lowering infrared radiation and visual characteristics, and a source interference technique. By coordination and application of various techniques, the overall performance of the aircraft can be optimized so that the aircraft can escape early detection by air defense detecting devices. GRA

N83-25955# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SYMMETRICAL TELECOMMUNICATIONS CABLE FOR 12-CHANNEL DIGITAL TELEPHONE
Tadeusz Lapinski 11 Jan. 1983 10 p Transl. into ENGLISH from Przeglad Telekomunikacyjny (Poland), v. 50, no. 9-10 p 286-288
(AD-A124776; FTD-ID(RS)T-1445-82) Avail: NTIS HC A01/MF A01 CSCL 17/2

In technologically developed countries digital systems are being broadly introduced. Time division of channels and pulse code modulation (PCM) are used. The main advantages of digital telemetric systems are the following: resistance to disturbances originating from crosstalk or internal noise sources, resistance to distortions introduced by the transmission circuit, and low costs. Production of long distance telecommunication cables for telemetric digital systems with binary bit flow rates of 8,448 mbit/sec was begun. Transmission of 120 channel telephone communication is now possible. Author

N83-25956# Army Engineer Topographic Labs., Fort Belvoir, Va. Research Inst.
MEASUREMENT TECHNIQUES OF ELECTRICAL PARAMETERS OF SURFACE MATERIALS IN THE X-BAND REGION Progress Research Note, Mar. 1981 - Mar. 1982
Frederick W. Rohde, Richard A. Hevenor, and Edmundo Simental Oct. 1982 57 p refs
(DA Proj. 4A7-62707-A-855)
(AD-A123806; ETL-0304) Avail: NTIS HC A04/MF A01 CSCL 17/9

Based on an in-depth study of the propagation of EM plane waves and TE(10) waves in materials, the relationships between wave propagation parameters and the electrical parameters of the materials are established. Quantities that are related to wave propagation parameters and can be measured are defined. Potential measurement techniques are analyzed and evaluated. Two measurement techniques are identified as suitable for surface materials measurements. A measurement system called Radar Parameter Instrumentation is described. GRA

N83-25957# California Univ., Berkeley. Operations Research Center.
POLYGON-TO-CHAIN REDUCTIONS AND EXTENSIONS FOR RELIABILITY EVALUATION OF UNDIRECTED NETWORKS
R. Kevin Wood Oct. 1982 84 p refs
(Contract NSF CEE-81-20642; Grant AF-AFOSR-0122-81; AF Proj. 2304)
(AD-A124145; ORC-82-12) Avail: NTIS HC A05/MF A01 CSCL 17/2

Analysis of network reliability is important in computer, communication, power and various other networks. Components of a particular network may be subject to random failure and the network may or may not continue to function after some of its components have failed. We wish, as efficiently as possible, to determine the probability that the network is functional. The purpose of this thesis is to develop new reduction techniques for computing network reliability and to show how computational complexity can be decreased by using these techniques. The network model which is used to this work may be thought of as a communication network with duplex communication links connecting various transceiving stations. Communication can pass in both directions along a link if the link is working; no communication in either direction is possible if the link has failed. The network is considered functional if a specified set of the transceiving stations is able to communicate. Author (GRA)

N83-25958# Electro Magnetic Applications, Inc., Denver, Colo.
ENGINEERING DESIGN GUIDELINES FOR ELECTROMAGNETIC PULSE HARDENING OF NAVAL EQUIPMENT Final Repo. t
S. R. Rogers, R. A. Perala, R. K. Rosich, R. B. Cook, and T. H. Rudolph 15 Jul. 1981 508 p refs
(Contract N60921-80-C-0190)
(AD-A123711) Avail: NTIS HC A22/MF A01 CSCL 15/5

This document is intended to be used by engineers who design and manufacture shipboard equipment. It is complete in the sense that both the EMP hazard and the means of mitigating the hazard (hardening) are presented. The hazard is described, which not only discusses EMP generation in a general sense, but it also presents specific threat levels for EMP fields and transient currents and voltages included on cables and antennas which are connected to electronic equipment. This specific threat constitutes an EMP survivability criteria which must be met by the mission critical equipment. The necessary hardening technology areas include volume shielding, cable shielding and connectors, interface susceptibility analysis, terminal protective devices, upset and upset hardening, common mode rejection techniques, optical isolation, and grounding/bonding techniques. Test techniques which can verify equipment hardness are presented along with methods to observe the equipment's hardness and maintain the hardness. Author (GRA)

N83-25959# Rome Air Development Center, Griffiss AFB, N.Y. C2 Arch Technology Branch.
SURVEY OF MODELS/SIMULATIONS AT RADC
Mary L. Denz Nov. 1982 62 p
(AF Proj. 5581)
(AD-A123752; RADC-TM-82-7) Avail: NTIS HC A04/MF A01 CSCL 17/2

A survey was conducted to evaluate the current state of the art and technology of model/simulation capabilities at Rome Air Development Center, Griffiss AFB, NY. This memo presents a tabulation of 28 such models/simulations. These models/simulations are being used within RADC in the development and evaluations of Command, Control, Communications and Intelligence (C3I) technology. The results of this survey are incorporated in this memo. Author (GRA)

N83-25960# Science Applications, Inc., McLean, Va.
RADIATION SOURCES AT ELECTRON CYCLOTRON HARMONIC FREQUENCIES Final Report, Jul. 1979 - Apr. 1980
Y. Y. Lau, D. Dialetis, A. Drobot, and A. Palevsky 28 Jan. 1983 134 p refs
(Contract N00173-79-C-0450)
(AD-A124072; SAI-83-134-WA) Avail: NTIS HC A07/MF A01 CSCL 14/2

This work covers an initial investigation of gyrotron devices operating in cylindrical geometry. Specific topics include an analysis of oscillations in a gyrotron travelling wave amplifier, the study of the effects of velocity spread and wall resistivity on gain and bandwidth in a gyrotron travelling wave amplifier, an investigation of mode competition in a cylindrical gyrotron cavity, and finally, a numerical cold testing of cavity modes in cylindrical structures. GRA

N83-25961# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
FREQUENCY AGILITY RADAR
Mao Yuhai 6 Dec. 1982 662 p refs Transl. into ENGLISH of the mono. "Pinlyu Jiebian Leida" China, National Defense Press, Oct. 1981 p 1-448
(AD-A124003; FTD-ID(RS)T-0603-82) Avail: NTIS HC A99/MF A01 CSCL 17/9

The performance of frequency agility radar including the strength of antijamming capabilities, the enlargement of the detection range, the raising of detection angle precision and the inhabition of the power of sea clutter was discussed. The composition of frquency agility radar focusing on the frequency agility magnetrons, the composition of incoherent and total coherency frequency agility radar, and the special frequency agility radar systems was introduced. Author

N83-25962# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.
A PRELIMINARY ASSESSMENT OF SOVIET DEVELOPMENT OF OPTIMUM SIGNAL DISCRIMINATION TECHNIQUES: OPTIMUM SPACE-TIME PROCESSING Final Report
Jerald W. Caruthers Oct. 1982 22 p refs
(AD-A123980; NORDA-TN-168) Avail: NTIS HC A02/MF A01 CSCL 12/1

This study provides an overview of Soviet work in the subject of optimum signal discrimination techniques. Its purpose is to aid U.S. scientists in becoming more familiar with an extensive signal processing effort of which they undoubtedly have had little prior awareness. It provides general substantive comment and bibliographic resource materials. If this work is successful in accomplishing its goal, it will serve as an example of reverse technology transfer. The Soviets have, for several decades, taken a more rigorous statistical approach to the study of oceanic processes and the theory of detection signals in the ocean environment than has the United States. The Soviets view this environmental as non-Gaussian, nonstationary, and nonwhite, and do not avoid the complications this presents to the formulation of the theory of optimum signal detection and estimation. There appears to be poor U.S. access to this work. The United States would probably benefit from selected uses of Soviet theory and algorithm developments in this topic. Soviet development of optimum signal detection and estimation techniques is broadly based, covering various aspects of radar, sonar, and communications. They have an extensive program in the development of optimum space-time processing (OSTP) and have extended the theory further than has the U.S. Their effort is based on the Karhunen-Loeve expansion extended to nonstationary space-time signals and noise. GRA

N83-25963# Adaptive Sensors, Inc., Santa Monica, Calif.
ADAPTIVE CANCELLATION OF SCATTERED INTERFERENCE Final Report
L. E. Brennan and I. S. Reed Dec. 1982 25 p refs
(Contract N00019-81-C-0519)
(AD-A123978) Avail: NTIS HC A02/MF A01 CSCL 17/4

This is the final report on a 1-year study of adaptive arrays in a scattered jamming environment. It is assumed that the jamming signals are scattered into the main receiving beam of radar or communication system. The scattering medium could be terrain, rain, or chaff. Conventional adaptive nulling which uses an angular discrimination cannot be used against this type of interference without also nulling the desired signal, since both the scatterers and signal source are in the main beam. A method of cancelling the scattered jamming signals is outlined in this report. The theory of this type of adaptive cancellation, presented in earlier reports on this contract, is also reviewed. The technique for cancelling scattered jamming uses delayed replicas of the jamming signal. Since the area or volume of scatterers may be large, the resulting adaptive canceller may require a large number of adaptive weights (e.g., 1000 or more). This suggests a complicated adaptive system and the importance of devising methods of simplifying the adaptive weight computation. It has been shown that the required number of adaptive degrees of freedom depends on the frequency spectrum of the jamming. With wide band noise jamming, this frequency spectrum depends on the receivers which can be designed to facilitate scatter cancellation. In earlier reports, two frequency spectra have been investigated, the rectangular bandlimited spectrum and the Gaussian spectrum. GRA

N83-25964# Illinois Univ., Urbana. Coordinated Science Lab.
UNDERSTANDING AND REPRESENTING NATURAL LANGUAGE MEANING Annual Report, 1 Aug. 1981 - 31 Jul. 1982
David L. Waltz, La Raw Maran, Marcy H. Dorfman, Rick Dinitz, and David Farwell Dec. 1982 44 p refs
(Contract N00014-75-C-0612)
(AD-A124088; T-119) Avail: NTIS HC A03/MF A01 CSCL 05/2

During this contract period the authors have: (1) continued investigation of events and actions by means of representation schemes called 'event shape diagrams'; (2) written a parsing program which selects appropriate word and sentence meanings by a parallel process know as activation and inhibition; (3) begun investigation of the point of a story or event by modeling the motivations and emotional behaviors of story characters; (4) started work on combining and translating two machine-readable dictionaries into a lexicon and knowledge base which will form an integral part of our natural language understanding programs; (5) made substantial progress toward a general model for the representation of cognitive relations by comparing English scene and event descriptions with similar descriptions in other languages; (6) constructed a general model for the representation of tense and aspect of verbs; (7) made progress toward the design of an integrated robotics system which accepts English requests, and uses visual and tactile inputs in making decisions and learning new tasks. GRA

N83-25965# Naval Surface Weapons Center, White Oak, Md. Systems Engineering Div.
COMPUTER TECHNIQUE FOR THEORETICAL ANALYSIS OF BEAMFORMERS AND ARRAYS
Edward J. Roth Sep. 1982 53 p
(AD-A125331; AD-F500131; NSWC/TR-82-376) Avail: NTIS HC A04/MF A01 CSCL 09/2

This report documents a computer program which simulates

the beamforming process of a planar array. It uses the physical characteristics, electrical shading characteristics and other factors to obtain detailed information of theoretical beam structures. Amplitude and phase coefficients can be varied to study main and side lobe structures for steered/unsteered and/or spread/unspread beam patterns. GRA

N83-25966# Mississippi Univ., University. Dept. of Electrical Engineering.
ANALYSIS OF ELECTROMAGNETIC PROPERTIES OF THE GROUND STAKE ANTENNA Progress Report, 15 Mar. - 31 Aug. 1982
C. M. Butler, C. A. Harrison, and A. W. Glisson, Jr. San Diego, Calif. NOSC 31 Aug. 1982 88 p refs
(Contract N66001-82-C-0045)
(AD-A125203; NOSC-CR-146) Avail: NTIS HC A05/MF A01 CSCL 09/5

In this interim technical report is described progress to date in the following facets of an investigation of the electromagnetic properties of the so-called ground stake antenna: (1) formulation and numerical analysis of integral equations for the problem of determining the characteristics of a coax-fed monopole antenna in a lossy medium, (2) formulation of the integral equation for a cylindrical antenna which resides in two contiguous half spaces, and (3) development of the measurement apparatus and techniques for the experimental investigation of the properties of a cylindrical antenna which resides in two contiguous half spaces. The report focuses upon the derivations of integral equations and the development of associated analytical/numerical techniques needed to solve them efficiently, as well as upon the construction of experimental apparatus and refinement of measurement schemes needed to collect data for corroboration of results obtained from the integral equation solutions. Author (GRA)

N83-25967# Naval Research Lab., Washington, D. C. Electromagnetic Branch.
BICOLLIMATED NEAR-FIELD GREGORIAN REFLECTOR ANTENNA Interim Report
J. B. L. Rao 9 Feb. 1983 16 p refs
(RR0210543)
(AD-A125197; NRL-8658) Avail: NTIS HC A02/MF A01 CSCL 09/5

A bicollimated near-field Gregorian reflector is structurally similar to a classical confocal parabolic reflector, but its surfaces are shaped to have better scan capability. A geometrical optics procedure is used in designing the reflector surfaces. A three dimensional ray tracing procedure is used in analyzing the aperture phase errors as the beam is scanned to different angles. The results show that the bicollimated configuration has about 45% greater angular scanning range than the corresponding confocal parabolic dual-reflector system. Author (GRA)

N83-25968# Southeastern Center for Electrical Engineering Education, Inc., St. Cloud, Fla.
BASIC EMC TECHNOLOGY ADVANCEMENT FOR C(3) SYSTEMS: SHIELD. VOLUME 4B. A DIGITAL COMPUTER PROGRAM FOR COMPUTING CROSSTALK BETWEEN SHIELDED CABLES Phase Progress Report, Jun. - Dec. 1981
Clayton R. Paul Griffiss AFB, N.Y. RADC Nov. 1982 165 p refs 6 Vol.
(Contract F30602-81-C-0062; AF Proj. 2338)
(AD-A124862; RADC-TR-82-286-Vol-4B) Avail: NTIS HC A08/MF A01 CSCL 20/14

This report contains the description and verification of a digital computer program, SHIELD, to be used in the prediction of crosstalk in transmission lines consisting of unshielded wires and/or shielded cables. The line may be above a ground plane (Type 1) or within an overall, circular, cylindrical shield which may be solid or braided and a wire (the shielded wire) located concentrically on the axis of the shield. All wires may be stranded and all conductors are treated as imperfect conductors; that is, their per-unit-length impedances are nonzero. Through-braid coupling for braided shields as well as diffusion for both types are included in the model. The shielded cables may have exposed sections at either end (pigtail sections) in which the shielded wire is not covered by the shield. Over these pigtail sections, a pigtail wire, parallel to the shielded wire, connects the shield to the reference conductor at that end via either a short circuit or an open circuit. These pigtail sections are included in the representation to simulate the common practice of terminating a shielded cable in a connector via these pigtail wires. The pigtail sections may be of different lengths. The program is written in FORTRAN IV and should be implementable on a wide range of digital computers. Author (GRA)

N83-25969# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
SPEECH RECOGNITION: ACOUSTIC PHONETIC AND LEXICAL KNOWLEDGE REPRESENTATION Status Report, 1 Jul. - 31 Dec. 1982
Victor W. Zue 22 Feb. 1983 6 p
(Contract N00014-82-K-0727)
(AD-A125134) Avail: NTIS HC A02/MF A01 CSCL 05/8

The purpose of this program is to develop a speech data base facility under which the acoustic characteristics of speech sounds in various contexts can be studied conveniently; investigate the phonological properties of a large lexicon of, say 10,000 words, and determine to what extent the phontactic constraints can be utilized in speech recognition; study the acoustic cues that are used to mark work boundaries; develop a test bed in the form of a large-vocabulary, IWR system to study the interactions of acoustic, phonetic and lexical knowledge; and develop a limited continuous speech recognition system with the goal of recognizing any English word from its spelling in order to assess the interactions of higher-level knowledge sources. GRA

N83-25970# Spectron Development Labs, Inc., Seattle, Wash.
INVESTIGATION OF THE RAYLEIGH CRITICAL ANGLE PHENOMENON FOR THE CHARACTERIZATION OF SURFACE PROPERTIES Quarterly Research and Development Status Report, Sep. - Nov. 1982
B. P. Hildebrand, G. L. Fitzpatrick, and A. J. Boland 30 Dec. 1982 35 p refs
(Contract F49620-81-C-0040; AF Proj. 2306; ARPA Order 4105)
(AD-A125050; SDL-83-2188-13TR; AFOSR-82-1093TR) Avail: NTIS HC A03/MF A01 CSCL 20/14

Rayleigh critical angle experiments (on a water-solid interface) have been performed on samples ranging from single crystals to polycrystalline alloys and glasses. Two basic conclusions can be drawn from this work: (1) linear equations of motion (which include anisotropy) suffice for an approximate description of the observations, including the calculation of critical angles from second order elastic constants; and (2) at and near the Rayleigh critical angle, anomalous production of harmonics is observed. GRA

N83-25971# Princeton Univ., N. J. Plasma Physics Lab.
HYPERBOLIC-SECANT MODE COUPLING
J. L. Doane Jul. 1982 31 p refs
(Contract DE-AC02-76CH-03073)
(DE82-020260; PPPL-1923) Avail: NTIS HC A03/MF A01

A solution of the coupled mode equations for a hyperbolic secant spatial variation of the coupling between two modes is presented. An analytic expression is given for the transmission coefficient for arbitrary complex differential propagation constant and coupling strength. The expression is particularly simple in the case when the differential attenuation between the modes is negligible. Design curves are presented in terms of normalized parameters. The hyperbolic secant coupling may be truncated and still yield virtually the same transmission as for infinite coupling length. The required coupling length is indicated by a comparison of the ideal expression with the results of numerical integration of the coupled mode equations. Hyperbolic secant coupling can be particularly useful for the design of low-loss bends and twists in overmoded waveguide. DOE

N83-25972# Bradford Univ. (England).
PROPAGATION STUDIES FOR FEEDER LINK DESIGN, VOL-

UME 1 Final Report
N. J. McEwan and M. J. Leitao Paris ESA Aug. 1982 55 p refs Sponsored by Fundacao Calouste Gulbenkian and Committee of Vice Chancellors and Principals of the Universities of the United Kingdom 2 Vol.
(Contract ESTEC-4471/80/NL-DG)
(ESA-CR(P)-1704-Vol-1; Rept-329-Vol-1) Avail: NTIS HC A04/MF A01

Propagation phenomena such as rain attenuation and cross polarization which impair the performance of 18 GHz feeder links to TV broadcast satellites, their effects and the means of counteracting them are studied. These effects lead to particularly difficult planning problems for the European orbital assignment at 19 deg W. Propagation impairments in the 10 to 30 GHz range and statistics of their occurrence for European regions are described. The use of power control (boosting during rain fading) with simultaneous cancellation of cross polarization is discussed. Possible RF hardware realizations of an open-loop forward-correction scheme for 18 GHz cross polarization cancellation controled by observing a 12 GHz satellite beacon are given. Cancellation performance is potentially better if opposite hands of circular polarization are used for the feeder link and beacon. Combined power control and forward cancellation are recommended as a means of retaining simple and flexible planning of these links. Author (ESA)

N83-25973# Bradford Univ. (England).
PROPAGATION STUDIES FOR FEEDER LINK DESIGN, VOLUME 2 Final Report
N. J. McEwan and M. J. Leitao Paris ESA Aug. 1982 184 p refs Sponsored by Fundacao Calouste Gulbenkian and Committee of Vice Chancellors and Principals of the Universities of the United Kingdom 2 Vol.
(Contract ESTEC-4471/80/NL-DG)
(ESA-CR-(P)-1704-Vol-2; Rept-328-Vol-2) Avail: NTIS HC A09/MF A01

A general description, both phenomenological and statistical, of propagation impairments in the 10 to 30 GHz range is given. The principal effects are attenuation due to rain and cross polarization due to both rain and ice particles; the discussion aims to provide a physical understanding of general principles. Statistics of their occurrence are also given for much of Europe. The problem of power control of feeder links is considered. The object is to boost the feeder line power during rain fading to maintain a nearly constant flux at the satellite. The method discussed is an open loop, forward correction scheme in which the Earth station will observe the rain fading on a 12 GHz satellite down link beacon (or possibly the TV signal itself) and will frequency scale the attenuatuion to 18 GHz to determine the degree of boosting of the feeder link power. S.L.

N83-25974# Selenia S.p.A., Rome (Italy). Space Activities Div.
IMAGE CODING ON BOARD SCIENTIFIC SATELLITES. REPORT 2: PERFORMANCE DEMONSTRATION Final Report
L. Chiariglione (Centro Studi e Laboratori Telecomunicazioni), L. Corgnier (Centro Studi e Laboratori Telecomunicazioni), M. Guglielmo (Centro Studi e Laboratori Telecomunicazioni), S. Boesso, M. DiLazzaro, and G. DeSantis Paris ESA 3 Sep. 1982 127 p refs 2 Vol.
(Contract ESTEC-4506/80/NL-HP)
(TN-0144/82-Vol-2; ESA-CR(P)-1706-Vol-2) Avail: NTIS HC A07/MF A01

The results obtained from the simulation of the various types of on-board image coders for predictive coding, transform coding and clustering are described in relation to the design of on board equipment for images with high redundancy reduction ratios. Two monospectral images of the Moon and one multispectral image of the Earth were used as input data. For two or three dimensional transform coding it is shown that partitioning in frequency classes gives little advantage, while the consideration of a scale factor is very useful. The performance evaluation of clustering algorithms shows that a uniform distribution of thresholds and barycenters is the best solution to the initial transient of the algorithm. Various types of prediction coding were tested leading to a choice of fixed predictor and to a conclusion that two laws for prediction switch described in previous work are essentially equivalent. Author (ESA)

N83-25975# Telespazio, S.p.A., Rome (Italy).
STUDY FOR ESTEC: TRAFFIC ROUTING IN A SWITCHED REGENERATIVE SATELLITE. TASK 1: TRAFFIC REQUIREMENTS
Paris ESA Sep. 1982 72 p 2 Vol.
(Contract ESTEC-4626/81/NL-MS(SC))
(ESA-CR(P)-1711-Vol-1) Avail: NTIS HC A04/MF A01

The telecommunications traffic volumes which can be routed on a large satellite in the European region, in the years 1990 to 2000 are forecasted. All the categories of services which are likely to be required were defined including well established services such as telephony as well as future requirements such as videoconferences or high speed facsimile at 2 Mbit/sec. The main European traffic sources were defined and the overall European traffic volume up to the year 2000 was determined. The criteria for subdividing the traffic between the terrestrial and the satellite media were examined. The results are given by country and type of service. Author (ESA)

N83-25976# Telespazio, S.p.A., Rome (Italy).
STUDY FOR ESTEC: TRAFFIC ROUTING IN A SWITCHED REGENERATIVE SATELLITE. TASK 2: REPEATER CONFIGURATIONS
G. Alaria (Centro Studi e Laboratori Telecomunicazioni) and F. Pattini (Centro Studi e Laboratori Telecomunicazioni) Paris ESA Sep. 1982 278 p refs 2 Vol.
(Contract ESTEC-4626/81/NL-MS(SC))
(ESA-CR(P)-1711-Vol-2) Avail: NTIS HC A13/MF A01

Configurations of repeaters suitable to carry forecasted European traffic are derived. Traffic volumes loading a large satellite in the European region up to the year 2000 are used as a design basis. The system would be a follow-on of the ECS system. The analysis is based on a two speed configuration with onboard speed conversion. The 64 Kbits/sec circuits (both telephone and low speed data) and the 2048 Mbit/sec circuits between international transit centres are studied. The 12 to 14 and 20 to 30 GHz bands are advocated. In one configuration all the access are 20 to 30 GHz spot beams in the up and down links. In the other configurations there are also Earth stations using a 14 GHz uplink and 12 GHz exclusive band downlink. Single and dual satellite solutions are considered. The dual satellite solution in the second configuration is preferred. Author (ESA)

N83-25977# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
A FOUR-ELEMENT DIRECTION-FINDING ANTENNA
B. L. Weber and J. A. Leise Sep. 1982 15 p refs
(PB83-137877; NOAA-TM-ERL-WPL-99; NOAA-82102701) Avail: NTIS HC A02/MF A01 CSCL 08C

An HF direction-finding method is described which determines simultaneously the azimuths of two signals. This method employs a four-element antenna and provides coverage over 360 degrees. It was used successfully in seven oceanographic experiments to measure ocean surface currents remotely in a complex multi-signal environment. The method is an integral part of an HF Doppler system that was developed to map currents routinely. GRA

N83-25978# National Bureau of Standards, Washington, D.C.
HYBRID GRIDNET: PACKET AND CIRCUIT SWITCHING IN A SINGLE NETWORK
R. T. Moore Oct. 1982 64 p refs
(PB83-136432; NBSIR-82-2588) Avail: NTIS HC A04/MF A01 CSCL 17B

GRIDNET is a packet switching network, composed of multiply connected dual loops, being developed for the Defense Nuclear Agency in order to provide highly survivable data communications among a large number of sites. This report describes a concept for overlaying such a network with additional channels and

switching facilities that may be used to establish point-to-point circuits on a demand basis. Switched connections are established following the exchange of appropriate frames between the stations that are involved. These exchanges use the regular GRIDNET packet switching facilities to provide essential supervisory and control functions including collision avoidance by means of circuit reservation in advance of connection. GRA

N83-25979# Siemens A.G., Munich (West Germany).
INTEGRATED FILTER FOR VIDEO COLOR PROCESSING
Horst Grobecker, Wolfgang Haussman, Heinz-Peter Heller, and Rainer Lueder Oct. 1982 85 p Transl. into ENGLISH of the mono. "Intergrierbare Filter fuer den Farbsignaiteil" (West Germany), May 1981 85 p Original language document was announced as N82-15300
(PB83-114579; BMFT-FB-T-81-085) Avail: NTIS HC A05/MF A01 CSCL 17B

Besides some analog integrated circuits, the PAL color decoder of a color TV set consists of various filters. Some of them can be integrated with modern semiconductor technologies. The advantages are a reduction in costs and adjustment and an increased reliability and performance. A concept was developed which uses CCD filters for the PAL-comb-filter, the luminance- delay-line and the color trap. These filters were fabricated and their performance was proved by measurement and by simulation with video signals. A PAL-video-IC, which includes the demodulation, amplifying, matrix and controlling was designed. It is matched to the CCD-filters. GRA

N83-26204# Technische Hogeschool, Delft (Netherlands). Microwave Lab.
PRINCIPLES OF RADAR MEASUREMENT
L. Krul *In* ESA Radar Calibration Feb. 1983 p 11-21 refs (For primary document see N83-26202 15-43)
Avail: NTIS HC A09/MF A01

N83-26205# Technische Univ., Berlin (West Germany). Inst. fuer luft- und Raumfahrt.
RADAR MEASUREMENT INSTRUMENTS
Paul Hartl *In* ESA Radar Calibration Feb. 1983 P 25-44 refs (For primary document see N83-26202 15-43)
Avail: NTIS HC A09/MF A01

N83-26206# Technische Hogeschool, Delft (Netherlands). Microwave Lab.
COHERENT AND NONCOHERENT SCATTEROMETERS
E. P. W. Attema *In* ESA Radar Calibration Feb. 1983 p 47-52 ref (For primary document see N83-26202 15-43)
Avail: NTIS HC A09/MF A01

N83-26207# Kansas Univ., Lawrence. Remote Sensing Lab.
SPACEBORNE SCATTEROMETERS
R. K. Moore *In* ESA Radar Calibration Feb. 1983 p 53-66 refs (For primary document see N83-26202 15-43)
Avail: NTIS HC A09/MF A01

N83-26208# British Aerospace Dynamics Group, Bristol (England). Space and Communications Div.
RADAR ALTIMETER CALIBRATION
C. R. Francis *In* ESA Radar Calibration Feb. 1983 p 69-81 refs Sponsored by ESA (For primary document see N83-26202 15-43)
Avail: NTIS HC A09/MF A01

N83-26209# Centre National d'Etudes Spatiales, Toulouse (France).
REAL APERTURE SIDE-LOOKING AIRBORNE RADAR
J. M. Lopez *In* ESA Radar Calibration Feb. 1983 p 85-94 refs (For primary document see N83-26202 15-43)
Avail: NTIS HC A09/MF A01

N83-26210# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
SAR CALIBRATION: A USER'S VIEWPOINT
A. D. Goldfinger, R. C. Beal, D. E. Irvine, F. M. Monaldo, and D. G. Tilley *In* ESA Radar Calibration Feb. 1983 p 95-99 refs (For primary document see N83-26202 15-43)
Avail: NTIS HC A09/MF A01

N83-26211# Environmental Research Inst. of Michigan, Ann Arbor. Radar Div.
SAR CALIBRATION: A TECHNOLOGY REVIEW
R. W. Larson, D. T. Politis, and J. L. Walker *In* ESA Radar Calibration Feb. 1983 p 101-115 refs (For primary document see N83-26202 15-43)
Avail: NTIS HC A09/MF A01

N83-26212# Systems Designers Ltd., Fleet (England).
EXPERIENCE GAINED FROM CALIBRATION OF THE SAR-580 SYSTEM
D. G. Corr and A. M. Smith *In* ESA Radar Calibration Feb. 1983 p 119-132 refs (For primary document see N83-26202 15-43)
Avail: NTIS HC A09/MF A01

N83-26214# Canada Centre for Remote Sensing, Ottawa (Ontario).
TRANSFER FUNCTIONS FOR PARTIALLY COHERENT SYSTEMS WITH APPLICATIONS TO SAR
Keith R. Raney *In* ESA Radar Calibration Feb. 1983 p 165-176 refs (For primary document see N83-26202 15-43)
Avail: NTIS HC A09/MF A01

N83-26215*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
AMPLITUDE CALIBRATION OF SPACEBORNE SYNTHETIC APERTURE RADARS
D. N. Held *In* ESA Radar Calibration Feb. 1983 p 177-180 (For primary document see N83-26202 15-43)
(Contract NAS7-100)
Avail: NTIS HC A09/MF A01 CSCL 17I

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N83-25980 Royal Signals and Radar Establishment, Malvern (England).
REVIEW OF CLIMATIC PROTECTION TECHNIQUES FOR ELECTRONIC EQUIPMENT
E. Napper Oct. 1982 44 p refs Sponsored by Ministry of Defence Procurement Executive
(RSRE-MEMO-3530; BR86763) Copyright. Avail: Issuing Activity

Changes in the British government's overseas policy and developing changes in military electronic equipment design motivated a long term R and D climatic protection progam. A review of the relevant factors of the problem is presented, with emphasis on the protection from the effects of water and water vapor in the atmosphere aided by temperature effects. The discussion includes climatic conditions, effect on equipment, mechanisms of moisture entry, dessication techniques, equipment containers, sealing standards, barrier materials, humidity indication, measurement techniques and logistic considerations. Author (ESA)

N83-25981 British Aerospace Dynamics Group, Stevenage (England). Dynamics Group.
ASSESSMENT OF MULTIWIRE TECHNOLOGY FOR GW APPLICATIONS
G. C. Maddy Dec. 1981 33 p
(BAe-ST-25939) Avail: Issuing Activity

A technology known as 'Multiwire' for producing circuit boards somewhat similar in construction and appearence to ordinary printed circuit boards is described. Polyimide insulated magnet wire is layed down on a adhesive covered epoxy glass board by a special wiring machine. Circuit terminations are formed by drilling through both wire and board and subsequently plating the insides of the holes integrally with the bare wire ends. Technical and commercial aspects of the system are compared with those of multilayer technology. Conclusions are that multiwire boards appear to be at least as good as multilayer for high density packaging of electronics, but service available from several sources for multilayer design and manufacture is quicker than for multiwire boards. The alternative option of an in-house manufacturing facility is discussed. Total cost estimates are of the same order for multiwire and multilayer boards. Author (ESA)

N83-25982*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NEW PROPULSION COMPONENTS FOR ELECTRIC VEHICLES
Richard R. Secunde [1982] 19 p refs Presented at the 18th Intersoc. Energy Conversion Engr. Conf., Orlando, Fla., 21-26 Aug. 1983
(Contract DE-AI01-77CS-51044)
(NASA-TM-83404; E-1682; NAS 1.15:83404; DOE/NASA/51044-31) Avail: NTIS HC A02/MF A01 CSCL 09C

Improved component technology is described. This includes electronically commutated permanent magnet motors of both drum and disk configurations, an unconventional brush commutated motor, ac induction motors, various controllers, transmissions and complete systems. One or more of these approaches to electric vehicle propulsion may eventually dispslace presently used controllers and brush commutated dc motors. S.L.

N83-25983*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
INELASTIC TUNNEL DIODES Patent Application
Lynn M. Anderson, inventor (to NASA) Filed 19 Apr. 1983 13 p
(NASA-Case-LEW-13833-1; US-Patent-Appl-SN-486471) Avail: NTIS HC A02/MF A01 CSCL 09A

Power is extracted from plasmons, photons, or other guided electromagnetic waves at infrared to mid-ultraviolet frequencies by inelastic tunneling in metal-insulator-semiconductor-metal diodes. Inealstic tunneling produces power by absorbing plasmons to pump electrons to higher potential. Specifically, an electron from a semiconductor layer absorbs a plasmon and simultaneously tunnels across an insulator into a metal layer which is at higher potential. The diode voltage determines the fraction of energy extracted from the plasmons; any excess is lost to heat. NASA

N83-25984*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A LINEARIZED TRAVELING WAVE AMPLIFIER WITH HARD LIMITER CHARACTERISTICS Patent Application
H. G. Kosmahl, inventor (to NASA) Filed 9 May 1983 13 p
(NASA-Case-LEW-13981-1; US-Patent-Appl-SN-492522) Avail: NTIS HC A02/MF A01 CSCL 09A

A traveling wave tube with increased linearity to avoid intermodulation of signals being amplified is described. A traveling electromagnetic wave and an electron beam interact to effect amplification of a radio frequency signal. L.F.M.

N83-25985*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EXPERIMENTAL VERIFICATION OF THE MULTISTAGE DEPRESSED COLLECTOR DESIGN PROCEDURE FOR A HIGH-PERVEANCE, HELIX-TYPE, TRAVELING-WAVE TUBE
James A. Dayton, Jr., Henry G. Kosmahl, and Peter Ramins May 1983 24 p refs
(NASA-TP-2162; E-1362; NAS 1.60:2162) Avail: NTIS HC A02/MF A01 CSCL 09A

The validity of a computational procedure for the design of multistage depressed collectors (MDC's) is demonstrated for a traveling wave tube (TWT) with a perveance of .00000123. The MDC is used with spent-beam refocusing to improve substantially the efficiency of the TWT. Reports on this subject have verified, under a variety of operating conditions, the MDC design procedure for TWT's with lower perveance. The design procedure is based on two computer programs that create a mathematical model of the electric and magnetic fields of the TWT refocuser MDC system and its electron beam. The two principal outputs of the analysis are a description of the radiofrequency (RF) performance of the TWT and the trajectories of representatives groups of charges from the input of the TWT to their points of interception on the MDC electrodes. S.L.

N83-25986# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
PULSE SWALLOWING-TYPE HIGH VELOCITY FREQUENCY PROGRAMMABLE DIVIDERS [DIVISORES PROGRAMAVEIS DE FREQUENCIAS DE ALTA VELOCIDADE DO TIPE PULSE SWALLOWING]
Paulo Adabo Apr. 1983 24 p refs In PORTUGUESE; ENGLISH summary Presented at the 35th Ann. Reunion of the SBPC, Belem, Brazil, 6-13 Jul. 1983
(INPE-2695-PRE/292) Avail: NTIS HC A02/MF A01

A technique used in the construction of frequency programmable dividers of high velocity, as well as the practical implementation of some dividers used in the frequency division in VHF band is presented. This technique allows frequency division by any entire value, using only one high velocity integrated circuit, while others dividers operate in a frequency much smaller than the input frequency. This allows power economy, greater facility in the construction of the layout and also reduction of the expenses. These dividers are also known as pulse swallowing dividers. Author

N83-25987# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
VHF FREQUENCY SYNTHESIZERS M.S. Thesis [SINTETIZADORES DE FREQUENCIAS EM VHF]
Paulo Adabo Apr. 1983 122 p refs In PORTUGUESE; ENGLISH summary
(INPE-2691-TDL/127) Avail: NTIS HC A06/MF A01

The study, design, and practical implementation of frequency synthesizers in the VHF band are presented. Several synthesis techniques are given. The most widely used technique, is that of frequency synthesis by PLL (phase locked loop), also known as a coherent indirect synthesis. This technique basically consists in using a PLL with a programmable divisor in the feedback loop. The output frequency is a function of the value of the divisor. Two prototypes were developed in the VHF band. One of them provides any one of 1200 different frequencies between 52, 020 MHz and 87,990 MHz, with uniform steps of 30 kHz. The SCPC ('single channel per carrier') carrier generated by this synthesizer comes out modulated in FM by a voice signal. Therefore this synthesizer also has the function of a FM modulation. The other synthesizer generates any one of 1200 different frequencies between 97,020 MHz and 132,990 MHz, also with uniform 30 kHz spacing. This synthesizer has the function of a local oscillator of the SCPC Earth station. S.L.

N83-25988# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DEVELOPMENT OF AN IMPROVED EXPLOSIVELY DRIVEN RUPTURED CONDUCTOR OPENING SWITCH M.S. Thesis
John David Watson and Michael Lee Hines Dec. 1982 125 p refs
(AD-A124671; AFIT/GE/EE/82D-39) Avail: NTIS HC A06/MF A01 CSCL 09/1

The purpose of this study was to determine the performance characteristics and limitations of two types of explosively driven ruptured conductor opening switches. The major finding of this study is that these switches can be used to combine the commandability of a ruptured conductor opening switch with the fast

switching characteristics of a fuse opening switch. We believe that the results in this report have direct applications to pulse power systems where commandable switching of high power pulses at low repetition rates is required. GRA

N83-25989# Illinois Univ., Urbana. Coordinated Science Lab.
SOME TECHNIQUES IN UNIVERSAL SOURCE CODING AND DURING FOR COMPOSITE SOURCES Ph.D. Thesis
Mark Stanley Wallace Dec. 1981 112 p refs
(Contract N00014-79-C-0424)
(AD-A124492; R-929; UILU-ENG-81-2260) Avail: NTIS HC A06/MF A01 CSCL 09/4

We consider three problems in source coding. First, we consider the composite source model. A composite source has a switch driven by a random process which selects one of a possible set of subsources. We derive some convergence results for estimation of the switching process, and use these to prove that the entropy of some composite sources may be computed. some coding techniques for composite sources are also presented and their performance is bounded. Next, we construct a variable-length-to-fixed-length (VL-FL) universal code for a class of unifilar Markov sources. A VL-FL code maps strings of source outputs into fixed-length codewords. We show that the redundancy of the code converges to zero uniformly over the class of sources as the blocklength increases. The code is also universal with respect to the initial state of the source. We compare the performance of this code to FL-VL universal codes. We then consider universal coding for real-valued sources. We show that given some coding technique for a known source, we may construct a code for a class of sources. We show that this technique works for some classes of memoryless sources, and also for a compact subset of the class of k-th order Gaussian autoregressive sources.
Author (GRA)

N83-25990# Edgerton, Germeshausen and Grier, Inc., Salem, Mass.
PHASE 2A BENCH MODEL DEVELOPMENT TACTICAL RUBIDIUM FREQUENCY STANDARD Final Technical Report, 16 Feb. - 16 Jun. 1982
William J. Riley Hanscom AFB, Mass. RADC Dec. 1982 34 p
(Contract F1628-81-C-0055; AF Proj. 2277)
(AD-A124462; RADC-TR-82-253) Avail: NTIS HC A03/MF A01 CSCL 14/2

A working bench model of a rubidium frequency standard has been designed and built that offers small size, fast warm-up and ruggedness for avionic applications. Author (GRA)

N83-25991# Lowell Univ., Mass.
ANALYSIS AND COMPUTER STUDIES OF MAGNETOSTATIC WAVE TRANSDUCERS Final Technical Report, 4 Jan. 1980 - 3 Jul. 1982
I. Jacob Weinberg Hanscom AFB, Mass. RADC Dec. 1982 64 p refs
(Contract F1628-80-C-0029; AF Proj. 2305)
(AD-A124530; RADC-TR-82-307) Avail: NTIS HC A04/MF A01 CSCL 09/1

We present the analysis and computer program for obtaining the dispersion relation, group delay, magnetostatic wave power, radiation resistance, radiation reactance and insertion loss for forward volume waves and backward volume waves. Included are the consideration of ground planes, apodization of the fundamental mode, multistrip meander line and parallel grating and isolated independent conductors for a uniform current distribution without variable coupling. The analysis, computer program and its use together with graphical results are presented. The analysis for obtaining the dispersion relation and group delay for volume waves with arbitrary orientation of the biasing field is presented here. The computer program and graphical results for cases of interest for the generalized dispersion relation for volume waves including ground planes are presented. Also included in the report are the results of attempting to obtain nondispersive, electronically tunable time delay elements by combining the group delays for volume waves of two different biasing field magnitudes in the same specified orientation. GRA

N83-25992# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
S-BAND VARIABLE TIME DELAY CIRCUIT ON BARIUM TETRATITANATE M.S. Thesis
Robert Francis Bellacicco Dec. 1981 106 p refs
(AD-A124754; AFIT/GE/EE/82D-21) Avail: NTIS HC A06/MF A01 CSCL 09/5

The performance requirements for a variable time delay circuit for use in a phased array antenna are given - time delay from 1/2 to 16 nsec, 3 GHz operating frequency, 20% bandwidth, temperature compensation, and compact size. A brief description is presented of various types of devices which could meet these requirements. In the research for the electrical structure of this time delay circuit, two design types were investigated. The first, a tapped transmission line, yielded poor results on a test circuit - high insertion loss (2-22 db) and high VSWR. The second design was that of a 5-bit network. Test circuit results showed this to be a relatively good design insertion loss of 0.7 - 5.0 db and VSWR of 1.8 and 2.5. A complete time delay circuit design was produced using a 4-bit structure for the RF transmission line (1/2 to 8 nsec in 1/2 nsec increments) and a loaded switched-line structure for selection of the amount of time delay. For temperature compensation, the circuit design was dimensioned for a barium tetratitinate microstrip substrate. Due to small substrate size, the maximum time delay was 8 nsec instead of 16 nsec. GRA

N83-25993# Northeastern Univ., Boston, Mass. Dept. of Electrical Engineering.
INVESTIGATION OF CHARACTERISTICS AND APPLICATIONS OF NEW CCD SIGNAL PROCESSING DEVICES Interim Report
Basil L. Cochrun and John G. Proakis Hanscom AFB, Mass. RADC Dec. 1982 44 p refs
(Contract F19628-79-C-0165; AF Proj. 4600)
(AD-A124504; RADC-TR-82-256) Avail: NTIS HC A03/MF A01 CSCL 09/5

This report describes work aimed toward the development of two high speed sampled analog signal processing modules based on charge device (CCD) technology. The modules will be controlled by a Z-80 microprocessor. The report provides an overview of the microprocessor software development efforts, a description of the circuitry for the refreshable sampled analog memory (RSAM), a functional description of the interface board designed for transferring data from the microprocessor to the CCD modules and the analog signal generator. Author (GRA)

N83-25994# Clemson Univ., S.C. Dept. of Electrical and Computer Engineering.
DYNAMIC SIMULATION OF AIRBORNE HIGH POWER SYSTEMS Final Report, 15 Aug. 1979 - 30 Jun. 1982
R. W. Gilchrist, Haren Almaula, Charles J. Alajajian, G. Frank Bell, D. D. Miller, E. S. Chen, F. C. Lee, C. Y. Chen, R. L. Avant, and R. Ramanathan Wright-Patterson AFB, Ohio AFWAL Nov. 1982 248 p refs Prepared in cooperation with Virginia Polytechnic Inst. and State Univ., Blacksburg, Va.
(Contract F33615-79-C-2047; AF Proj. 3145)
(AD-A123730; AFWAL-TR-82-2092) Avail: NTIS HC A11/MF A01 CSCL 10/2

This report describes work done in modeling components and in simulating AC and DC charging systems using these components. The components modeled were three phase AC generators, three phase transformers, SCR's and SCR's in AC and DC resonant charging arrays. Mathematical and circuit models were developed and simulations were conducted using SCEPTRE, a CAD program. The generator model is in terms of phase variables and allows for consideration of direct and quadrature axis damping, nonlinearities due to saturation, variation in speed and is formulated so that prime mover and control components may be added later. The transformer model is a circuit model which allows inclusion of coupling between phases and saturation effects. The SCR model

is a conversion of the SPICE 2 model to a SCEPTRE model with features to account for turn-off and turn-on transients encountered in AC and DC charging applications. Simulations were conducted with the SCR models in AC and DC charging arrays. Snubbers and other compensating networks were designed to suppress undesirable transients and assure proper turn-on and turn-off. Author (GRA)

N83-25995# Semetex Corp., Torrance, Calif.
PIN DIODE SWITCHABLE CAPACITANCE ARRAYS Final Report
Aram A. Tanielian and Joan M. Crishal Dec. 1982 27 p
(Contract N62269-79-C-0300; WF21200000)
(AD-A123766; NADC-78159-40) Avail: NTIS HC A03/MF A01 CSCL 09/5

The contract requirement was the development of a monolithic 10 capacitor/pin diode array to be used as a tuning element in an electronically tuned filter. The initial integrated circuits exhibited stray capacitances between the circuit elements through the high resistivity silicon substrate and the MOM capacitors did not have a high enough Q for optimum circuit performance. Therefore, the remaining effort was directed toward the development of a discrete PIN diode with a low enough RF resistance in conjunction with the required capacitance value to combine with high Q microwave capacitors in a hybrid circuit. This diode/capacitor array fits into a 0.6 x 0.4 inch area which reduced the number of available devices to six from ten due to the size of the units. This is the array which was finally delivered. The hybrid array occupies much more area than the proposed integrated circuit, but it appears to be the best way to reduce the parasitics of the capacitor/diode array. GRA

N83-25996# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CONCEPT OF BUILDING INTERFACE BY INTERACTION OF ELECTRONIC MEASURING DEVICES WITH MICROCOMPUTER
G Naumann 21 Dec. 1982 13 p refs Transl. into ENGLISH from Pomiary Automat. Kontr. (Poland), v. 25, no. 6, Jun. 1979 p 202-204
(AD-A124078; FTD-ID(RS)T-1444-82) Avail: NTIS HC A02/MF A01 CSCL 14/2

Problems involving the application of microcomputers in measuring devices and new standard link structures arising in connection with the latter, satisfying international requirements. Author

N83-25997# Army Electronics Research and Development Command, Fort Monmouth, N. J. Electronics Technology/Devices Lab.
MIXED CONDUCTION IN SEMI-INSULATING GALLIUM ARSENIDE
J. J. Winter, H. A. Leupold, R. L. Ross, and A. Ballato Dec. 1982 24 p refs
(DA Proj. 1L1-61102-AH-47)
(AD-A123859; DELET-TR-82-12) Avail: NTIS HC A02/MF A01 CSCL 20/10

Hall effect and conductivity measurements made on semi-insulating bulk GaAs are examined by a new approach to mixed conduction analysis. Based on Fermi level and electron mobility analyses of conductivity and Hall coefficient, it uses revised values of effective densities of states at the band edges, and electron/hole mobility ratios recently adopted by other workers. The treatment provides a visual analysis of the system in terms of the electrical parameters and impurity densities, and establishes criteria for the onset of mixed conduction. Author (GRA)

N83-25998# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Electrical Engineering.
MULTILEVEL COMPUTER-AIDED DESIGN OF VLSI DIGITAL SYSTEMS Final Report, Sep. 1979 - Oct. 1982
S. W. Director, D. P. Siewiorek, and D. E. Thomas 23 Dec. 1982 26 p refs
(Contract DAAG29-79-C-0213)
(AD-A123967; ARO-16532.4-EL) Avail: NTIS HC A03/MF A01 CSCL 09/5

This report discusses work completed toward the development of a user-oriented, multilevel simulation system for the VLSI circuit designer. Design representations which include several different levels of design have been developed. Two design aids, a mixed circuit and logic level simulator and timing abstraction aid for behavioral simulation have been developed. In addition, an interactive user-machine interface for these design aids has been developed. Author (GRA)

N83-25999# Southeastern Center for Electrical Engineering Education, Inc., St. Cloud, Fla.
BASIC EMC TECHNOLOGY ADVANCEMENT FOR C(3) SYSTEMS. VOLUME 4C: CROSSTALK IN TWISTED-WIRE CIRCUITS Phase Progress Report, Jun. - Dec. 1981
Marty B. Jolly and Clayton R. Paul Griffiss AFB, N.Y. RADC Nov. 1982 127 p refs 6 Vol.
(Contract F30602-81-C-0062; AF Proj. 2338)
(AD-A124863; RADC-TR-82-286-Vol-4C) Avail: NTIS HC A07/MF A01 CSCL 09/3

An investigation of wire-to-wire crosstalk is presented in an attempt to accurately predict the magnitude of the voltage coupled to a twisted wire pair. A sensitivity analysis of the twisted wire pair is conducted to determine the effect that line twist has on the coupled differential mode voltage when the twisted pair is connected in an unbalanced configuration. An improved computer model is developed to aid in the prediction of the voltage coupled to the twisted wire pair when it is terminated in low impedance loads. Another circuit configuration which is investigated consists of a differential line driver connected to a differential line receiver by a twisted wire pair. Predictions of the common mode voltage coupled to the twisted pair are computed with a single wire model and a comparison is made with experimental results. Author (GRA)

N83-26000# Purdue Univ., Lafayette, Ind. School of Electrical Engineering.
A COMPARISON OF CUBE TYPE AND DATA MANIPULATOR TYPE NETWORK
Robert J. McMillen and Howard Jay Siegal Oct. 1982 10 p refs Presented at the 3rd Intern. Conf. on Distributed Computing Systems, Oct. 1982
(Grants NSF ECS-80-16580; AF-AFOSR-3581-78; AF Proj. 2304)
(AD-A125010; AFOSR-82-1096TR) Avail: NTIS HC A02/MF A01 CSCL 09/5

The interconnection of a large number of processors and other devices to form a parallel/distributed computing system is a research area receiving a great deal of attention. One method is to use a multistage network. This paper compares two classes of multistage networks by examining two representative networks: the Generalized Cube and the Augmented Data Manipulator. The two topologies are compared using a graph theoretic approach. By interpreting the graphical representations of the networks in different ways, different implementations result. The costs of the various implementations are compared taking very large scale integration considerations into account. Finally, the robustness of the different networks is measured and contrasted. Author (GRA)

N83-26001# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Physics.
ELECTRICAL RELAXATION IN RARE EARTH DOPED CUBIC LEAD FLUORIDE Interim Technical Report
John J. Fontanella and Mary C. Wintersgill Nov. 1982 17 p refs
(Contract N00014-83-AF-00001)
(AD-A125066; TR-5) Avail: NTIS HC A02/MF A01 CSCL 20/3

Audio frequency complex impedance measurements are performed over the temperature range 5.5 to 380 K on lead fluoride doped with ten rare earths and lanthanum at various concentrations. It is found that the complexity of the relaxation spectrum increases as the size of the trivalent ion decreases. Specifically, for the largest rare earths, only one relaxation is found. GRA

N83-26002# Westinghouse Electric Corp., East Pittsburgh, Pa. Advanced Systems Technology Div.
PHASE 2: FREQUENCY DOMAIN ANALYSIS OF LOW-FREQUENCY OSCILLATIONS IN LARGE ELECTRIC-POWER SYSTEMS. VOLUME 3: STUDIES OF THE MAPP SYSTEM Final Report
R. T. Byerly, D. E. Sherman, and R. J. Bennon Apr. 1982 177 p refs Sponsored by EPRI
(EPRI Proj. 744-1)
(DE82-903864; EPRI-EL-2348-Vol-3) Avail: NTIS HC A09/MF A01

An eigenvalue analysis of a large electric power system using the computer program AESOPS is decribed. It illustrates the kind of investigation for which the program is intended and discusses procedures for efficient program application. Data are from the MAPP (Mid-Continent Area Power Pool) system. The situations studied serve the needs of this project with regard to computer program development and do not necessarily reflect power system engineering concerns of the MAPP organization. Study results include descriptions of ten intersystem modes of oscillation and fifty local modes. The ten intersystem modes are studied in sufficient detail to show the effects of a selected set of contingencies, the effects of dc line supplementary controls, and the effects of power system stabilizers. A method of calculating approximate eigenvalues at significantly reduced costs produces acceptable accuracy for all ten intersystem modes. DOE

N83-26003# Westinghouse Electric Corp., East Pittsburgh, Pa. Advanced Systems Technology Div.
PHASE 2: FREQUENCY DOMAIN ANALYSIS OF LOW-FREQUENCY OSCILLATIONS IN LARGE ELECTRIC-POWER SYSTEMS. VOLUME 4: INTERIM REPORTS ON LINEAR SYSTEM MODELS Final Report
R. T. Byerly, D. E. Sherman, and R. J. Bennon Apr. 1982 251 p Sponsored by EPRI
(EPRI Proj. 744-1)
(DE82-903812; EL-2348-Vol-4) Avail: NTIS HC A12/MF A01

This volume is a collection of interim reports used to assemble and develop information on linearized mathematical models. The material contained herein covers generator models, excitation system models and turbine speed-governing system models. The material presented in this volume was used in the development of the original small-scale computer program that calculates the natural frequencies of damping of generator rotor oscillations. DOE

N83-26004# General Electric Co., Schenectady, N. Y. Electric Utility Systems Engineering Dept.
HVDC-AC SYSTEM INTERACTION FROM AC HARMONICS. VOLUME 1: HARMONIC IMPEDANCE CALCULATIONS Final Report
G. D. Breuer, J. H. Chow, C. B. Lindh, N. W. Miller, F. H. Numrich, W. W. Price, A. E. Turner, and R. R. Whitney Sep. 1982 345 p refs Sponsored by EPRI 2 Vol.
(EPRI Proj. 1138-1)
(DE82-021015; EPRI-EL-2583-Vol-1) Avail: NTIS HC A15/MF A01

Improved methods are needed to characterize ac system harmonic behavior for ac filter design for HVDC systems. The filter design practice is evaluated and methods for calculating system harmonic impedances are investigated. An overview of ac filter design for HVDC systems and a survey of literature related to filter design were performed. Two methods for calculation system harmonic impedances were investigated. In the measurement method, and instrumentation system for measuring system voltage and current were assembled. Different schemes of using the measurements to calculate system harmonic impedances were studied. In the analytical method, a procedure to include various operating conditions were proposed. Computer programs for both methods were prepared, and the results of the measurement and analytical methods analyzed. A conclusion of the project is that the measurement and analytical methods both provided reasonable results. DOE

N83-26005# General Electric Co., Schenectady, N. Y. Electric Utility Systems Engineering Dept.
HVDC-AC SYSTEM INTERACTION FROM AC HARMONICS. VOLUME 2: COMPUTER-PROGRAM DOCUMENTATION Final Report
G. D. Breuer, J. H. Chow, C. B. Lindh, N. W. Miller, F. H. Numrich, W. W. Price, and A. E. Turner Sep. 1982 149 p ref Sponsored by EPRI 2 Vol.
(EPRI Proj. 1138-1)
(DE82-020969; EPRI-EL-2583-Vol-2) Avail: NTIS HC A07/MF A01

The need for the system harmonic impedance information and methods to determine it by test and/or calculation is addressed. The project undertook research to measure harmonic impedances and sources on a power system and to modify existing analytical techniques to more closely match the field test measurements. The information will improve the ability of a utility to describe the ac system for filter design. DOE

N83-26006# Oak Ridge National Lab., Tenn.
SPARK DECOMPOSITION STUDIES OF DIELECTRIC GAS MIXTURES
I. Sauers and L. G. Christophorou 1982 4 p refs Presented at the 7th Intern. Conf. on Gas Discharges and Their Applications, London, 31 Aug. 1982
(Contract W-7405-eng-26)
(DE82-020911; CONF-820866-1) Avail: NTIS HC A02/MF A01

The ultimate usefulness of a high voltage insulating gas depends not only on the ability of the gas to withstand high voltages, but also on the degradation of the gas resulting from spark discharges, corona or prolonged electrical stress and the effect(s) of the by-products on the equipment and, possibly, the environment. In view of these considerations, the study of long-range spark decomposition was undertaken in an effort to improve the decomposition characteristics of dielectric gases through proper tailoring of gas mixtures while maintaining high breakdown strengths. The data reported are on the analyses of gases sparked by capactive (0.1 micro F) discharge into a 0.5-mm gap, resulting in an energy input of approximately 5 J per spark. The nature of the decomposition products of SF6 formed by high voltage discharges observed is found to be critically dependent on impurities (particularly H2O), electrode material and insulating materials present in the system. Author

N83-26007# Bendix Corp., Kansas City, Mo.
CIRCUIT ANALYZES RZ PULSE TRAINS
W. Fuller Jan. 1983 6 p Submitted for publication
(Contract DE-AC04-76DP-00613)
(DE83-006283; BDX-613-2851) Avail: NTIS HC A02/MF A01

Pulse trains coded in any one of a variety of formats are frequently used to transmit telemetry data or other coded information. Equipment is needed for both coding and decoding functions to code the data and to decode or analyze the data. Many versatile pieces of equipment exist for analyzing pulse train data. However, in cases where only one type of data exists, in this case RZ data, the circuit presented can do the job with minimal parts count. This circuit was used to simplify design, and make easy construction checkout and troubleshooting. The main feature is that the circuit can lock on to data that are available on one line only. It will synchronize to the data without having a line present that transmits the clock pulses of the original data source. In this example, the frequency of the data source was known to be 200 KHZ and the incoming data had been preconditioned to a 5-V TTL signal. DOE

N83-26008# Societe Europeenne de Propulsion, Vernon (France).
ELECTRIC MOTORS AND ACTUATORS AT CRYOGENIC TEMPERTURES Final Report
J. P. Bugeat, J. Macaigne, and D. Valentian Paris ESA 1982 117 p refs
(Contract ESA-4761/81/NL-DK)
(TS/SE/JPB/10253/82; ESA-CR(P)-1699) Avail: NTIS HC A06/MF A01

A small electric motor and an actuating mechanism for use at temperatures around 4.2 K under ultra high vacuum was tested in order to assess the feasibility of such a driving mechanism working in the coldest part of a spacecraft cryostat. A variable reluctance stepping motor driving a simple screw nut mechanism was used. Dry lubrication was provided by polyimide slide bearings and nut and by composite retainer roller bearings. Motor and mechanism sustained extended tests at liquid helium temperature with continuous operation for 8 hr periods and faultless restart after 16 hr rest periods. Power consumption was reduced to 15 mV leading to low liquid helium comsumption. Post test analysis indicates no change in motor characteristics and no damage to bearings, screw and nut. Author (ESA)

N83-26009# Research Inst. of National Defence, Linkoeping (Sweden).
A BROADBAND SUBHARMONICALLY PUMPED MILLIMETER WAVE MIXER
Staffan Rudner Feb. 1983 25 p refs
(FOA-C-30314-E) Avail: NTIS HC A02/MF A01

A broadband balanced mixer which uses an antiparallel pair of beam lead Schottky diodes is described. Mixer performance in the range 58 to 75 GHz was studied using a local oscillator frequency around 32 GHz. Mixer conversion loss is 11.0 + or - 1.6 dB over the band 58 to 67 GHz when optimized for broadband operation. This result compares well with other broadband systems but is 1 dB above the optimum result expected from theory. Between 67 and 75 GHz the conversion has a large resonance dip, probably due to an intrinsic resonance in the diodes. Author (ESA)

N83-26010# National Inst. for Aeronautics and Systems Technology, Pretoria (South Africa).
A TWO-WEIGHT ANALOG LMS ADAPTIVE FILTER
G. H. Fellingham and P. Vermeulen Feb. 1982 23 p
(PB83-137612; ISBN-0-7988-2352-6; NIAST-82/07) Avail: NTIS HC A02/MF A01 CSCL 09E

The building and testing of an analog two-weight LMS adaptive filter is described. GRA

N83-26011# Physical Research Lab., Ahmedabad (India).
COMPUTER STUDY OF A PHASE SCANNED 56 ELEMENT SBF ARMY
Ramesh Sharma, P. Muralikrishna, S. K. Shah, and P. Venat Jun. 1982 36 p refs
(PB83-135756; PRL/TN-82-02) Avail: NTIS HC A03/MF A01 CSCL 09E

As part of the design study of a high power MST Radar, the theoretical radiation pattern of a 256 element phase scanned Shot Back Fire (SBF) antenna array was studied in detail using computer software and the results are reported here. The array consists of identical SBF elements arranged in a planar doubly periodic array in a 16 x 16 geometry. The interelement distance is chosen as 1 lambda, so that the mutual coupling between the individual SBF elements can be neglected. The effect of introducing differential phase gradients between the SBF elements is also studied in detail, with an ultimate objective of arriving at an upper limit for the antenna beam steerability by the differential phase gradient technique. GRA

N83-26012# National Bureau of Standards, Washington, D.C. National Measurements Lab.
THE PRACTICAL USES OF AC-DC TRANSFER INSTRUMENTS Final Report
Earl S. Williams Oct. 1982 41 p refs
(PB83-133637; NBS-TN-1166) Avail: NTIS HC A03/MF A01 CSCL 09C

Alternating currents and voltages are measured most accurately when they are compared with nominally equal and known dc currents and voltages. The comparisons are usually made with thermal transfer instruments which respond nearly equally to ac and dc quantities. Practical information and recommended procedures are given for using these instruments along with diagrams of apparatus and examples of typical data and calculations. Methods for minimizing difficulties caused by dc reversal differences, thermal drift, energy picked up from local electromagnetic fields, and the deviation from square law response of these instruments are considered. Causes of ac-dc differences are discussed, and methods for measuring them and applying corrections are also described. GRA

N83-26013# Technische Hogeschool, Delft (Netherlands). Onderafdeling der Wiskunde en Informatica.
ON THE VAN DER POL-MECHANISM IN THE THEORY OF WIND-INDUCED VIBRATIONS OF OVERHEAD LINES
A. H. P. vanderBurgh 1982 19 p refs
(PB83-138503) Avail: NTIS HC A02/MF A01 CSCL 09A

In this paper an asymptotic theory of wind-induced vibrations of a single overhead line is presented. The theory includes the introduction of variables which are significant for the mathematical description of galloping phenomena and their starting mechanism. It is shown that the nonlinear equation as postulated by Meyerscough is a generating equation for the calculation of first order and higher order asymptotic approximations of the solutions of the equations governing the motion of an overhead line. Author (GRA)

N83-26014# National Bureau of Standards, Washington, D.C.
FIELD CIRCUIT BREAKER TESTER Final Report, Jan. 1980 - Feb. 1981
P. Michael Fulcomer May 1982 54 p Sponsored in part by Consumer Product Safety Commission
(PB83-136382; NBSIR-81-2301) Avail: NTIS HC A04/MF A01 CSCL 09A

Test equipment developed at National Bureau of Standards (NBS) for the Consumer Product Safety Commission (CPSC) to evaluate the performance of single-pole circuit breakers in residential installations is described along with instructions for its use. The procedures are intended to be carried out by a test crew of at least two persons. DOE

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N83-26015 Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
FLUID FLOW STUDIES OF MOLTEN SALT ELECTROLYTIC CELLS BY LASER SCHLIEREN IMAGING M.S. Thesis
Peter Todd Rogers Jun. 1982 34 p refs
Copyright. Avail: Issuing Activity

The advantages of using Laser Schlieren photography to study the electrodeposition of zinc in a ZnCl2 - LiCl - KCl molten salt cell are considered. The experimental apparatus is described as well as materials problems in the machining of the electrode holders. Author

N83-26016*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A VISCOUS SHOCK-LAYER FLOWFIELD ANALYSIS BY AN EXPLICIT-IMPLICIT METHOD
R. M. Gupta, P. A. Gnoffo, and R. W. MacCormack (Washington Univ., Seattle) May 1983 18 p refs Presented at the AIAA 18th Thermophys. Conf., Montreal, 1-3 Jun. 1983
(NASA-TM-84668; NAS 1.15:84668; AIAA-83-1423) Avail: NTIS HC A02/MF A01 CSCL 20D

An implicit analogue of a widely used explicit method to external axisymmetric laminar flows with strong entropy gradients is extended. The details of the 'numerics' of the implicit part are provided in a body oriented coordinate system with a moving outer

(shock) boundary during the transient part of the solutions. The limiting values of the Courant number are obtained when the shock boundary is treated explicitly. The solution algorithm outlined includes the treatment of the source term associated with the equations in weak conservation form. From the results obtained for two sample problems, it becomes clear that accuracy of predictions is, indeed, very good at higher values of the Courant number. There is a significant saving in overall computing time, depending on the Courant number used and the flow Reynolds number. These properties combined with the simplicity of programming the implicit analog may appeal to researchers for using it in the analysis of 3-D flow problems. S.L.

N83-26017*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A 4-CYLINDER STIRLING ENGINE COMPUTER PROGRAM WITH DYNAMIC ENERGY EQUATIONS Final Report
Carl J. Daniele and Carl F. Lorenzo May 1983 65 p refs
(Contract DE-AI01-77CS-51040)
(NASA-TM-83053; E-1348; NAS 1.15:83053;
DOE/NASA/52040-44) Avail: NTIS HC A04/MF A01 CSCL 10B

A computer program for simulating the steady state and transient performance of a four cylinder Stirling engine is presented. The thermodynamic model includes both continuity and energy equations and linear momentum terms (flow resistance). Each working space between the pistons is broken into seven control volumes. Drive dynamics and vehicle load effects are included. The model contains 70 state variables. Also included in the model are piston rod seal leakage effects. The computer program includes a model of a hydrogen supply system, from which hydrogen may be added to the system to accelerate the engine. Flow charts are provided. Author

N83-26018# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Theoretische Stroemungsmechanik.
THE CALCULATION OF IMCOMPRESSIBLE THREE-DIMENSIONAL LAMINAR AND TURBULENT BOUNDARY LAYERS IN THE PLANE OF SYMMETRY OF A PROLATE SPHEROID AT INCIDENCE
Gert Reinhard Schneider and Ziqiang Zhu (Beijing Inst. of Aeronautics and Astronautics) Jul. 1982 49 p refs
(DFVLR-FB-82-16) Avail: NTIS HC A03/MF A01

A numerical method was developed for computing the incompressible three-dimensional laminar and turbulent boundary layers in the plane of symmetry of a prolate spheroid at incidence. Elliptical coordinates are used and the results are obtained by an implicit finite difference method, namely, the two point box method. The initial values are obtained rom a stagnation point solution. For the leeward side calculations the numerical procedure is started behind the geometric singular point at the nose of the body with the stagnation point profiles. For the laminar case and different thickness ratios and angles of incidence the development of the wall shear stress values are predicted and compared with results of other authors. For the turbulent case, a comparison with experimental data is given. Author

N83-26019# Los Alamos Scientific Lab., N. Mex.
CONCHAS-SPRAY: A COMPUTER CODE FOR REACTIVE FLOWS WITH FUEL SPRAYS
L. D. Cloutman, J. K. Dukowicz, J. D. Ramshaw, and A. A. Amsden May 1982 201 p refs
Avail: NTIS HC A10/MF A01

The CONCHAS-SPRAY computer code, which solves the equations of transient multicomponent chemically reactive fluid dynamics, together with those for the dynamics of an evaporating liquid spray is described. The code is of quite general applicability, but was developed with applications to internal combustion engines specifically in mind. The formulation is spatially two dimensional, and encompasses both planar and axisymmetric geometries. In the latter case, the flow is permitted to swirl about the axis of symmetry. CONCHAS-SPHAY is a time marching finite difference code that uses a partially implicit numerical scheme. Spatial differences are formed with respect to a generalized two dimensional mesh of arbitrary quadrilaterals whose corner locations are specified functions of time. Author

N83-26020# Air Force Geophysics Lab., Hanscom AFB, Mass. Aeronomy Div.
ON THE DIFFERENCE BETWEEN WAVES AND TURBULENCE IN A STRATIFIED FLUID Final Report
Edmond M. Dewan 2 Nov. 1982 39 p refs
(AD-A126321; AFGL-TR-82-0352; PSRP-661) Avail: NTIS HC A03/MF A01 CSCL 20/4

What are the theoretical and experimental physical differences between waves and turbulence? The motivation behind this question is related to the practical problems associated with laser beam propagation and pollution transport in the atmosphere. Because turbulence causes mixing and waves do not, one must not regard turbulence as a field of random waves. The power density spectrum of velocity fluctuations, when taken alone, cannot be used to distinguish between waves and turbulence. Its physical interpretation can differ radically depending upon which type of motion is involved. Two approaches are used here to differentiate theoretically and experimentally between waves and turbulence. The first involves the degree of interaction between modes. The second approach depends on the mixing property of turbulence. Author

N83-26021# Naval Research Lab., Washington, D. C.
MULTIDIMENSIONAL NUMERICAL METHODS FOR THE SIMULATION OF SHOCK-GENERATED TURBULENCE
J. M. Picone and J. P. Boris 30 Dec. 1982 18 p refs
(ARPA Order 4395)
(AD-A123235; NRL-MR-4967) Avail: NTIS HC A02/MF A01 CSCL 20/4

We discuss shock-generated turbulence as related to the dynamics of hot gaseous channels produced by laser pulses and electric discharges in gaseous atmospheres. Accurate models of channel development must account for compressible flows, which are associated with shocks that are present at early times, as well as the incompressible residual motion which is responsible for channel cooling. We present an efficient numerical technique which uses the flux-corrected transport algorithm and permits automatic adjustment of the time step to account for both types of behavior. Comparisons of two-dimensional calculations to theory and to experimental data on laser channels show good agreement. Our numerical results reveal a mechanism by which the distribution of turbulent scale lengths is generated during energy deposition. Author (GRA)

N83-26022# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
EFFECT OF DIVIDER PLATE TRAILING EDGE SHAPE ON THE MIXING OF PARALLEL FLOWS M.S. Thesis
William D. Vahle Dec. 1982 103 p refs
(AD-A124738; AFIT/GAE/AA/82D-29) Avail: NTIS HC A05/MF A01 CSCL 20/4

The objective of this effects is to investigate the mixing process as characterized by velocity and turbulence data. The effects of divider plate trailing edge modifications upon the mixing of parallel co-flowing air streams is also examined. Five divider plate trailing edge configurations were tested at velocity ratios from 0.3 to 1.0 with a maximum velocity of 300 ft/sec. A two element hot film anemometer was used to determine the flow velocities and turbulence. Wake growth rate determined from velocity and turbulence profiles was the primary indicator of mixing. The modification which extended beyond the original plate thickness produced the highest wake growth rates and was the best mixer. No reliable correlation between maximum turbulence and mixing ability was determined. Author (GRA)

N83-26023# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DESIGN OF CHOKING CASCADE TURNS M.S. Thesis

Jason Baird Dec. 1982 79 p refs
(AD-A124792; AFIT/GAE/AA/82D-3) Avail: NTIS HC A05/MF A01 CSCL 16/4

Five different shock-positioning cascades, for short-radius turns in ramjet inlet diffusers, were designed and tested on the AFIT water table. These flow controllers were to perform the same function as the conventional arrangement of an aerodynamic grid and a long-radius turn. The tests were to determine the suitability of the water table for such experimentation, in addition to determining the flow-control capabilities and pressure recovery of the cascades. All five designs accomplished the flow-control function as designed, and two designs exhibited the same or better pressure recovery than the aerodynamic grid. The water table proved to be an excellent means of testing these cascades, primarily due to the ease of flow visualization in the tests done. The shock-positioning cascade, short-radius turn concept shows promise and should be tested further in gas-dynamic apparatus.
Author (GRA)

N83-26024# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
WINDOW PERFORMANCE IN EXTREME COLD
S. N. Flanders, J. S. Buska, and S. A. Barrett Dec. 1982 29 p
(DA Proj. 4A7-62730-AT-42)
(AD-A124528; CRREL-82-38) Avail: NTIS HC A03/MF A01 CSCL 13/13

Extreme cold causes heavy buildup of frost, ice and condensation on many windows. It also increases the incentive for improving the airtightness of windows against heat loss. Our study shows that tightening specifications for Alaskan windows to permit only 30% of the air leakage allowed by current American airtightness standards is economically attractive. We also recommend triple glazing in much of Alaska to avoid window icing in homes and barracks. We base our conclusions on a two year field study of Alaskan military bases that included recording humidity and temperature data, observing moisture accumulation on windows and measuring airtightness with a fan pressurized device. GRA

N83-26025# Naval Postgraduate School, Monterey, Calif. Dept. of Aeronautics.
DUAL PROBE DIGITAL SAMPLING (DPDS) TECHNIQUE FOR ROTOR FLOWS: REVIEW OF THE DEVELOPMENT AND AN ASSESSMENT BASED ON EARLY RESULTS Final Report, Oct. 1980 - Mar. 1982
H. J. Heinemann Apr. 1982 155 p refs Sponsored in part by DFVLR
(Contracts N62271-80-M-2214; N00019-82-WR-21036)
(AD-A123778; NPS67-82-009) Avail: NTIS HC A08/MF A01 CSCL 20/4

The state of the art in the development of the DPDS technique at the Turbopropulsion Laboratory at the Naval Postgraduate School is reported. In principle, this method allows the determination of three dimensional flow fields behind rotors. A review of the instrumentation and hardware is given and two different data reduction procedures developed earlier are described. The results of reducing one set of rotor exit data using the two methods are compared. In order to verify the experimental procedures at low cost, a bench-top periodic flow generator was used first to provide signals similar in type and frequency to those from the Transonic Compressor in which the rotor exit flow was measured. The data measured in the compressor were analyzed, and problems encountered in the routine application of the reduction methods were identified. The possible application of similar techniques in the Rotating Annular Cascade (RGG) at the DFVLR Gottingen is assessed and recommendations are made for the coordination of future experimental programs. Author (GRA)

N83-26026# Minnesota Univ., Minneapolis. Dept. of Mechanical Engineering.
STUDIES OF HEAT TRANSFER IN COMPLEX INTERNAL FLOWS Summary Report, 15 Dec. 1981 - 15 Dec. 1982
E. M. Sparrow Jan. 1983 111 p refs
(Contract N00014-79-C-0621; NR Proj. 097-437)
(AD-A124017; SR-3) Avail: NTIS HC A06/MF A01 CSCL 13/1

Experiments have been performed to determine the heat transfer and pressure drop response of heat exchange devices subject to highly complex fluid flows. Three research problems were undertaken and completed, each dealing with a different aspect of heat exchanger performance. In one case, per-tube transfer coefficients were measured in a tube bank in the presence of abrupt upstream enlargement of the flow cross section. Enhancement of the heat transfer was found to occur as a result of the flow disturbance caused by the enlargement. In the second research problem, the effect on heat transfer of the competition between tubes which draw air from a common plenum was investigated. This competition resulted in a skewing of the flow entering the tubes. Significant effects of the skewing occurred when the tubes were relatively close together (pitch approx. 1.5 tube diameters), but for larger spacings the heat transfer coefficients were virtually identical to those for a single tube. In the last of the problems, the effects of flow maldistribution caused by partial blockage of the inlet of a flat rectangular duct were investigated. Large spanwise nonuniformities of the local heat transfer coefficient were induced by the maldistributed flow. The spanwise average heat transfer coefficients in the downstream portion of the duct were found to be enhanced due to flow maldistribution, whereas at more upstream locations a reduction of the coefficients occurred. Author (GRA)

N83-26027# Hydrologic Engineering Center, Davis, Calif.
TWO-DIMENSIONAL FLOW MODELING: PROCEEDINGS OF THE NATIONAL U.S. ARMY CORPS OF ENGINEERS-SPONSORED SEMINAR
Robert C. MacArthur, ed., D. Michael Gee, ed., and Arlen D. Feldman, ed. Mar. 1982 283 p refs Seminar held at Davis, Calif., 7-9 Jul. 1981
(AD-A123847) Avail: NTIS HC A13/MF A01 CSCL 08/8

The objectives of the seminar were: (1) to bring together developers, users, and potential users of two-dimensional mathematical models to develop a continuing dialogue concerning applications experience, problem identification, research goals, model evaluation, operational problems and model limitations; (2) to make researchers working in the areas of riverine and flood plain simulation aware of recent advances in coastal and estuarine modeling; and, (3) to examine mechanisms for transferring technology to field offices and field needs to research programs. The seminar emphasized two-dimensional homogeneous flows in the horizontal plane such as occur in rivers and well-mixed bays and estuaries. Papers focused on model application, features, performance and utility rather than recent research advances.
GRA

N83-26028# Naval Postgraduate School, Monterey, Calif.
OSCILLATING FLOW ABOUT YAWED CYLINDERS Progress Report, Sep. 1982 - Mar. 1983
Turqut Sarpkaya Mar. 1983 127 p refs
(Grant NSF CEE-82-10248)
(AD-A124093; NPS69-83-001) Avail: NTIS HC A07/MF A01 CSCL 20/4

The forces acting on yawed smooth and rough circular cylinders in oscillating flow have been investigated for the purpose of determining the appropriate force-transfer coefficients and the applicability of the independence principle. The results have shown that the flow about each cylinder is unique and the independence principle does not hold true over the range of Reynolds numbers and Keulegan-Carpenter numbers covered by the investigation. It has further been shown that Morison's equation predicts the measured force with the same degree of accuracy as that for the normal cylinder provided that the force-transfer coefficients appropriate to each yaw angle, Reynolds number, Keulegan-Carpenter number, and the relative roughness are used.
Author (GRA)

N83-26029# Ballistic Research Labs., Aberdeen Proving Ground, Md.
MOMENT ON A LIQUID-FILLED SPINNING AND NUTATING

PROJECTILE: SOLID BODY ROTATION Final Report
Nathan Gerber and Raymond Sedney Feb. 1983 59 p refs Supersedes ARBRL-IMR-754
(DA Proj. 1L1-61102-AH-43)
(AD-A125332; AD-F300194; ARBRL-TR-02470; ARBRL-IMR-754) Avail: NTIS HC A04/MF A01 CSCL 20/4

The moment exerted on the casing by a completely spun-up liquid filling a spinning and nutating right circular cylinder is evaluated. Among the restrictions of the theory are (1) assumption of small yaw angle, and (2) constant spin and nutational frequencies and timewise exponential yaw growth. The new feature of this work is the inclusion of viscous shear in the liquid force on the cylinder walls. It is found that the viscous shear contributes significantly to the overturning moment in many instances. Outputs are compared with those of the theory of Murphy, which makes the additional assumption of inviscid flow except for boundary layers near the walls. Results of the two theories agree well for high Reynolds numbers (>or=5x0.0001) but diverge increasingly as Reynolds number is decreased. Comparisons of calculated yaw growth rates are made with measurements taken in gyroscope experiments for aspect-ratios of 1.0 and 3.1. The differences between theory and experiment are greater for the 3.1 aspect-ratio cylinder than for the 1.0 case. The present theory generally shows better agreement with experiment at the lower Reynolds numbers than does the Murphy theory. Both theories demonstrate a strong sensitivity of yaw growth rate to variation in cylinder aspect ratio. GRA

N83-26030# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ACCURACY OF FINITE DIFFERENCE METHODS FOR SOLUTION OF THE TRANSIENT HEAT CONDUCTION (DIFFUSION) EQUATION M.S. Thesis
Thomas Sidney Chivers, Jr. Feb. 1983 97 p refs
(AD-A124846; AFIT/GNE/PH/83M-3) Avail: NTIS HC A05/MF A01 CSCL 12/1

The two dimensional transient heat conduction (diffusion) equation was solved using the fully explicit, fully implicit, Crank-Nicholson implicit, and Peaceman-Rachford alternating direction implicit (ADI) finite difference methods (FDMTHs). The general stability condition for the same FDMTHs was derived by the matrix, coefficient, and a probabilistic method. The matrix, coefficient, and probabilistic methods were found to be equivalent in that each lead to the same general stability condition. Oscillatory behavior of the fully explicit FDMTH was as predicted by the general stability condition. Though the Crank-Nicholson implicit and the Peaceman-Rachford ADI FDMTHs were expected to be unconditionally stable, unstable oscillations were observed for large sizes of time step. For large numbers of time steps and sizes of time steps for which all FDMTHs considered are stable, the Crank-Nicholson implicit FDMTH is the more accurate. Author (GRA)

N83-26031# Harry Diamond Labs., Adelphi, Md.
RESONANT FREQUENCIES AND DAMPING OF A LIQUID DROP WITH A RIGID SPHERICAL CORE
C. A. Morrison Feb. 1983 14 p refs
(AD-A125132; HDL-TL-83-3) Avail: NTIS HC A02/MF A01 CSCL 20/4

Rayleigh's method is used to obtain the resonant frequencies of a liquid drop with a rigid core. The decay time of the drop is calculated by using Rayleigh's dissipation function and by assuming that the fluid in the drop and the external medium are viscous. It is shown that special cases reduce to known results. Author (GRA)

N83-26032# Harry Diamond Labs., Adelphi, Md.
THE SHAPE OF A LIQUID DROP IN THE FLOW OF A PERFECT FLUID
Clyde A. Morrison Feb. 1983 9 p refs
(AD-A125073; HDL-TL-83-2) Avail: NTIS HC A02/MF A01 CSCL 20/4

A method of analysis previously used to determine the shape of a liquid drop in an electric field has been applied to determine the shape of a drop in the flow of a perfect fluid. The surface of the drop is expanded in a series of Legendre polynomials with arbitrary coefficients. Minimization of the total energy with respect to the coefficients then gives equations for their determination. Due to the similarity of the equations for determining the coefficients to previous results, it is expected that the shape of the drops will deviate considerably from the usually assumed oblate spheroids. Author (GRA)

N83-26033# Defence Research Establishment Suffield, Ralston (Alberta).
THE DISTRIBUTION OF AEROSOL PARTICLES DOWNSTREAM IN A TURBULENT FLUID JET
Kathy I. Leary and Stanley B. Mellsen Dec. 1982 40 p refs
(AD-A125049; DRES-SM-1077) Avail: NTIS HC A03/MF A01 CSCL 20/4

A mathematical model has been developed to predict the downstream distribution of particles in a fluid jet. The particles were initially assumed to be evenly dispersed over a cross-section of the circular jet, near the source of the jet, and, with computer-aided methods, the co-ordinates of the particles at a specified distance downstream were determined. The computer program was also built in such a manner that the paths of specific particles, from their initial upstream position to their final position downstream, could be completely followed. Some graphical results of these paths are presented for various particle sizes. Author (GRA)

N83-26034# Los Alamos Scientific Lab., N. Mex.
FLOW REGIMES
Dennis R. Liles 1982 5 p refs Presented at the 9th US Natl. Congr. of Appl. Mech., Ithaca, N.Y., 21-25 Jun. 1982
(Contract W-7405-eng-36)
(DE82-015811; LA-UR-82-129; CONF-820614-2) Avail: NTIS HC A02/MF A01

Internal boundaries in multiphase flow greatly complicate fluid dynamic and heat transfer descriptions. Different flow regimes or topographical configurations can have radically dissimilar interfacial and wall mass, momentum, and energy exchanges. To model the flow dynamics properly requires estimates of these rates. The common flow regimes for gas-liquid systems are defined and the techniques used to estimate the extent of a particular regime are described. Also, the computer code procedures are delineated and a potentially better method is introduced. DOE

N83-26035# Oak Ridge National Lab., Tenn. Engineering Technology Div.
FEASIBILITY OF AN UNCONVENTIONAL HEAT-FLOW-MEASURING TECHNIQUE TO DETERMINE COEFFICIENT OF PERFORMANCE ON INSTALLED HEAT PUMPS
V. R. Brantley Jan. 1983 50 p refs
(Contract W-7405-eng-26)
(DE83-005340; ORNL/TM-8587) Avail: NTIS HC A03/MF A01

Tests were performed on two split residential heat pump systems in the laboratory to determine the suitability of an unconventional heat flow measuring technique proposed for use in an instrument that determines the coefficient of performance of installed heat pumps. This technique uses the ratio of measured heat flow to measured temperature difference in the resistance heating mode to calculate heat flow in the refrigerant heating model form the measured temperature difference during normal heat pump operation. Distance of the supply air temperature sensor from the indoor unit and resistance heater power level were found to be significant parameters that could be controlled to minimize error. Accuracy of the proposed heat flow measuring technique of units in field service was judged to be within 5%. DOE

N83-26036# Sandia Labs., Livermore, Calif. Analytical Thermal/Fluid Mechanics Div.
FILTERING OF SOUND FROM THE NAVIER-STOKES EQUATIONS
S. Paolucci Dec. 1982 50 p refs
(Contract DE-AC04-76DP-00789)
(DE83-005967; SAND-82-8257) Avail: NTIS HC A03/MF A01

An approximation leading to anelastic equations capable of describing thermal convection in a compressible fluid is given. These equations are more general than the Oberbeck-Boussinesq equations and different than the standard anelastic equations in thay they can be used for the computation of convection in a fluid with large density gradients present. It is shown that the equations do not contain acoustic waves, while at the same time they can still describe the propagation of internal waves. Throughout is is shown that the filtering of acoustic waves, within the limits of the approximation, does not appreciably alter the description of the physics. DOE

N83-26037# California Univ., Livermore. Lawrence Livermore Lab. Computation Dept.
SOFTWARE REQUIREMENTS DEFINITION FOR THE HIGH-PRESSURE-GAS-METERING DATA-ACQUISITION SYSTEM
J. Joseph Brandt 24 Jan. 1983 20 p
(Contract W-7405-eng-48)
(DE83-006414; UCID-19669-Rev-8) Avail: NTIS HC A02/MF A01

A prototype computer system for Cell 1001D is discussed. It is used for controlling helium gas pressurization rates and data acquisition. The system will include calibration, pre-test checkout, data acquisition, control, real-time capabilities, simple data analysis and data display. The system will provide post-test reports, plots, and printouts. DOE

N83-26038# Societe Anonyme Belge de Constructions Aeronautiques, Brussels (Belgium).
DEVELOPMENT OF SMALL CRYOGENIC HEAT PIPES, PHASE 3 REPORT
J. P. Mathieu Paris ESA Sep. 1982 149 p refs
(Contract ESA-3737/78)
(JPM/LN/H05/N106; ESA-CR(P)-1700) Avail: NTIS HC A07/MF A01

Stainless steel heat pipes of 3 and 6mm diameter featuring a mesh capillary, charged with either ethane, methane, nitrogen or oxygen, 1 m and 0.35 m in length and with 0.8, 0.2 and 0.1 m condenser lengths were submitted to determination of their maximum power versus temperature and versus tilt. Priming behavior, burst pressure, leak detection technique, and resistance to sine and random vibrations were studied. Information concerning these features is used to complete a set of detail specifications for all the heat carriers concerned. Author (ESA)

N83-26039# European Space Agency, Paris (France).
COMPUTATION OF THREE-DIMENSIONAL UNSTEADY NON-UNIFORM FLOW IN THE BLADE-FREE ANNULAR CHANNEL OF A TURBOMACHINE
Pierre Bry and Pierre Laval Apr. 1983 87 p refs Transl. into ENGLISH of "Calcul Numerique Tridimensionnel Instationnaire Heterogene dans une Veine Annulaire de Turbomachine" rept. ONERA-NT-1982-2, ONERA, Paris, 1982 Original report in FRENCH previously announced as N82-32372
(ESA-TT-779; ONERA-NT-1982-2) Avail: NTIS HC A05/MF A01

Three dimensional unsteady nonuniform compressible flow in the annular duct of an axial turbomachine fed under steady nonuniform conditions is computed using the disintegration method. A computation program for the case of severe distortion in the total inlet pressure level, with or without swirling motion, is outlined. Results show the effect of initial swirl of the flow in the presence of nonuniformities of the total pressure, characterized in particular by a modification of the three dimensional flow pattern in the cylindrical duct. Author (ESA)

N83-26040# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Theoretische Stroemungsmechanik.
THE CALCULATION OF INCOMPRESSIBLE THREE-DIMENSIONAL LAYERS INDUCED BY A CIRCULAR CYLINDER ERECTED ON A FLAT PLATE
Ziqiang Zhu Sep. 1982 58 p refs Sponsored in cooperation with Chinese Aeronautical Establishment
(DFVLR-FB-82-29) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 18,20

The incompressible three-dimensional flow induced by a circular cylinder erected on a flat plate was computed for both laminar and turbulent cases on the basis of boundary layer approximation. The governing equations are solved by use of an implicit finite difference method, the two-point Box-method. A generalized mixing length model based on an anisotropically distributed eddy viscosity was employed for the Reynolds shear stress in the turbulent case. Comparisons of the present numerical results with other theoretical and experimental data show generally good agreement. Author (ESA)

N83-26041# Queensland Univ., Brisbane (Australia). Dept. of Civil Engineering.
BLOCKAGE AND ASPECT RATIO EFFECTS ON FLOW PAST A CIRCULAR CYLINDER FOR 10000 > R > 100000
G. S. West and C. J. Apelt Oct. 1981 69 p
(PB83-144295; RR-CE29) Avail: NTIS HC A04/MF A01 CSCL 20D

A series of experiments produced comparable results in which the relatively small changes in the flow past a circular cylinder associated with varying blockage ratios are clearly distinguished. The experiments cover a range of blockage from 2 to 16% and of aspect ratios from 4 to 10. End plates were fitted to the cylinders. GRA

N83-26042# National Bureau of Standards, Washington, D.C. National Engineering Lab.
METHOD OF TESTING, RATING AND ESTIMATING THE SEASONAL PERFORMANCE OF GROUND-WATER-SOURCE HEAT PUMPS
William J. Mulroy Nov. 1982 60 p refs Sponsored in part by DOE
(PB83-137778; NBSIR-81-2434) Avail: NTIS HC A04/MF A01 CSCL 13A

The part load and seasonal performance of residential ground water source heat pumps operating in both heating and cooling modes was studied. Methods are outlined for testing and rating these units which account for the variation in performance due to part load operation and change in source water temperature. A calculation procedure is presented which can be used to estimate the seasonal performance and seasonal cost of operation of residential ground water source heat pumps. GRA

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources.* For related information see also *06 Aircraft Instrumentation,* and *19 Spacecraft Instrumentation.*

N83-26043 Royal Signals and Radar Establishment, Malvern (England).
E BEAM: AN OPERATING SYSTEM FOR PARTICLE BEAM LITHOGRAPHY
B. C. Merrifield Oct. 1982 30 p refs
(RSRE-MEMO-3512; BR86524) Copyright. Avail: Issuing Activity

A modular suite of subroutines, designed to provide an operating environment for an electron beam lithography machine is described. The suite runs on any PDP-11 16-bit minicomputer with sufficient memory under the RT11 or RSX-11M operating systems. Module names, peripheral addresses and instructions for installation and operation under both operating systems are given together with descriptions of available commands and a list of error messages with possible causes and remedies. Author (ESA)

N83-26044# Clemson Univ., S.C. Dept. of Mechanical Engineering and Mechanics.
DEVELOPMENT OF TECHNIQUES FOR PHOTOGRAPHING BRITTLE COATINGS IN FRACTURE STUDIES
R. Kent Crawford 6 Dec. 1982 23 p refs
Avail: NTIS HC A02/MF A01

A brief review of photography is presented, introducing the parameters studied and the techniques in use. This information is used as the basis for determining the types of film and corresponding development techniques which are best suited for photographing undirectional composite laminates coated with a brittle lacquer. From the photographs, a film and development procedure were determined which yield the sharpness required. Conclusions and recommendations are presented as well as the photographs used in the analysis. Finally, a detailed procedure for photographing and processing is included. S.L.

N83-26045# National Aerospace Lab., Amsterdam (Netherlands).
DEVELOPMENT OF A NON-INSULATED CRYOGENIC STRAIN-GAUGE BALANCE. ESTIMATE OF THE ACCURACY OF BALANCE NR. 771 AT TEMPERATURES BETWEEN 90K AND 300K
[1983] 9 p
(IN-8; TP-82-005-U) Avail: NTIS HC 02/MF A01

The influence of the combination of loads acting on it, the temperature, and the temperature gradients on a three component cryogenic balance was investigated. The effect of combined loads is determined at room temperature and is taken into account by means of a normal second order calibration. The temperature effects give rise to the application of four corrections on the test data. The estimated accuracy of the cryogenic balance presented is the summation of the accuracy at room temperature, and the accuracy with which the corrections were determined. The measurement of aerodynamic drag appears to be considerably less accurate than the measurement of the lift and pitching moment, mainly due to the influence of temperature gradients. A.R.H.

N83-26046# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ANALYSIS OF ACOUSTIC-OPTIC ERRORS IN LASER GYROSCOPES M.S. Thesis
Eileen M. Walling Dec. 1982 114 p refs
(AF Proj. 2305)
(AD-A124648; AFIT/GEP/PH/82D-1) Avail: NTIS HC A06/MF A01 CSCL 20/5

Acousto-optic modulators frequency shift and spatially orient the laser beam within the laser gyroscope cavity. The accuracy of the gyroscope is directly related to the modulator performance. This study investigates two commercial styles of modulators and their impact on gyroscope operation. The drive frequency of the modulators was varied to measure the angular shifts of the first order diffracted beam. The angular deflections concurred with manufacturer specifications with a maximum mean difference of -0.1869 milliradians and maximum standard deviation of 0.2005 milliradians. Using these angular values, the reflectivities of the flat mirrors within the cavity were then determined. These calculations displayed an average reflectivity of .999567 with most changes occurring in the seventh decimal place, indicating that properly aligned modulators do not affect mirror reflectivity or gyroscope finesse. GRA

N83-26047# Woods Hole Oceanographic Institution, Mass.
TECHNICAL REPORT ON A PORTABLE GRAVITY METER PLATFORM AND FIRST TEST RESULTS
Robert G. Goldsborough, Edward K. Scheer, and Carl Bowin Jan. 1983 30 p refs
(Contract N00014-82-C-0019)
(AD-A124697; WHOI-83-4) Avail: NTIS HC A03/MF A01 CSCL 14/2

This report describes the new portable platform and gravity meter system which has been assembled at the Woods Hole Oceanographic Institution. It consists of three functionally distinct parts. The first of these is a recently developed gyro-stabilized two-axis platform. This platform has been designed to carry the vibrating string accelerometer (VSA) and its associated oven assembly as the gravity sensor. The new platform represents a major reduction in both size and weight over other platforms suitable for gravity measurement. The second major part of this system is a new gravity readout which interfaces with the VSA, processes the VSA output, and prepares the resulting filtered acceleration data for output to the acquisition system. The readout has been designed to allow flexible use of the gravity system on a variety of vehicles, including ships, submarines and aircraft. The third part of this new meter is the data acquisition system. It consists of a microprocessor interfaced to a Kennedy 9-track tape drive. Both the platform and the readout are connected to the microprocessor. Results are presented from Endeavor cruise 88 that demonstrate the ability of the platform to stabilize the gravity meter and for the gravity system to produce raw data with a resolution of 48 milligals at a sampling rate of 10 Hz. GRA

N83-26048# SRI International Corp., Menlo Park, Calif.
DEVELOPMENT OF HIGH-RESOLUTION THERMOPROBE Final Technical Report, 1 Feb. 1982 - 31 Jan. 1983
T. Kobayashi and D. A. Shockey Jan. 1983 30 p refs
(Contract N00014-82-K-0169)
(AD-A123994) Avail: NTIS HC A03/MF A01 CSCL 14/2

A method is being developed for measuring temperature with very high spatial (0.5 micron) and temporal (10 ns) resolution. This method, which exploits the light absorption characteristics of semiconductors, is of interest for studying the temperature rises associated with high-rate material deformation processes such as rapid crack propagation, sliding friction and wear, and shock-induced detonation of explosives. This report discusses the analytical and experimental examination of the temperature response of CdS single crystals and vapor-deposited polycrystalline films. A temperature sensitivity of 0.03K and a range of 300K were obtained. These values depended strongly on film thickness, film vapor-deposition processes, and post-deposition annealing, showing that sensitivity and range can be tailored somewhat for specific applications. GRA

N83-26049# Army Tank-Automotive Command, Warren, Mich.
HOLOGRAPHIC ANALYSIS OF LARGE VEHICLE STRUCTURES Final Technical Report, Jul. 1980 - Apr. 1982
Grant R. Gerhart, Gregory Arutunian, and James M. Graziano Jul. 1982 100 p refs
(AD-A124102; TACOM-TR-12595) Avail: NTIS HC A05/MF A01 CSCL 14/2

A highly tuned, double pulse, Q-switched ruby laser is used to make double exposure holograms of large vibrating objects. The holographic fringe patterns are interpreted to produce a detailed knowledge of the displacement amplitude for a wide variety of vibrating objects. A triggering system permits the firing of the laser relative to arbitrary phase orientations of the vibrating object. A primary emphasis is placed upon the holograms at the same amplitude and frequency but different phase angles yields valuable information about the dynamics of the vibrating vehicle components. These interferometric fringe patterns reveal important information about global displacement amplitude and stress concentrations. Author (GRA)

N83-26050# Army Research Inst. of Environmental Medicine, Natick, Mass. Heat Research Div.
A MICRO-COMPUTER BASED SYSTEM FOR HIGH PRECISION TEMPERATURE MEASUREMENT USING PLATINUM RTD'S
William T. Matthew 16 Jul. 1982 21 p
(DA Proj. 3E1-61102-BS-10)
(AD-A124080; USARIEM-T6/82) Avail: NTIS HC A02/MF A01 CSCL 09/2

A micro-computer controlled system for 10 channel high precision temperature data acquisition has been developed. The temperature sensing elements are Platinum Resistance Thermometer Devices (RTD's). Probe construction, using standard, commercially available RTD elements is described and wiring and switching requirements for the 4-wire resistance measurements are noted. The system consists of a Digital Equipment Corp.

MINC-11 Computer linked, via IEEE-488 interface bus cables, to a HP (Hewlett-Packard) 34555A Digital Volt/Ohm Meter, an HP-3495A Scanner/Multiplexer, and, during calibration, a HP 2804A Quartz Thermometer. Two programs are employed: one for probe calibration and the other for the temperature measurement application. In the calibration program, the ten probes are individually calibrated against the Quartz Thermometer which has an absolute accuracy specification of + or 0.04 C. A proportional control water bath having a thermal stability specification of + or - 0.004 C provided the common thermal medium during calibration. Currently a three point calibration spanning 6 C (37 to 43 C) is employed. The individual probe constants are computed and recorded on a computer file for access via the temperature measurement program. An initial evaluation of the precision of the calibrated RTD system against the Quartz Thermometer reading yielded an overall precision of + or - 0.0004 C and worst case error of less than + or - 0.01 C. Author (GRA)

N83-26051# Monsanto Research Corp., Miamisburg, Ohio.
INSTRUMENTATION FOR OPTIMIZING AN UNDERGROUND COAL-GASIFICATION PROCESS
W. Seabaugh and R. E. Zielinski Jun. 1982 8 p refs Presented at the Symp. on Instrumentation and Control for Fossil Energy Processes, Houston, Tex., 7 Jun. 1982
(Contract DE-AC04-76DP-00053)
(DE82-015843; MLM-2951-(OP); CONF-820612-2) Avail: NTIS HC A02/MF A01

While the United States has a coal resource base of 6.4 trillion tons, only seven percent is presently recoverable by mining. The process of in-situ gasification can recover another twenty-eight percent of the vast resource, however, viable technology must be developed for effective in-situ recovery. The key to this technology is system that can optimize and control the process in real-time. An instrumentation system is described that optimizes the composition of the injection gas, controls the in-situ process and conditions the product gas for maximum utilization. The key elements of this system are Monsanto PRISM Systems, a real-time analytical system, and a real-time data acquisition and control system. This system provides from complete automation of the process but can easily be overridden by manual control. The use of this cost effective system can provide process optimization and is an effective element in developing a viable in-situ technology. DOE

N83-26052# Sandia Labs., Albuquerque, N. Mex. Electronic Technology Div.
DESIGN AND OPERATION OF AN EQUIPMENT INTERFACE FOR RECORDING DATA ONTO SERIAL DEVICES
J. E. Hopwood Aug. 1982 24 p
(Contract DE-AC04-76DP-00789)
(DE82-021706; SAND-82-8006) Avail: NTIS HC A02/MF A01

The design and operation of an interface equipment for receiving digital data from a precision, commercial, two-axis coordinate digitizer are described. The equipment then processes and transmits these data to character-serial recording devices (a minifloppy disk recorder, a display terminal, and a computer). DOE

N83-26053# Sandia Labs., Albuquerque, N. Mex. Geotechnical Engineering Div.
RADIOMETRIC MASS FLOWMETER FOR TWO-PHASE SOLIDS/GAS STREAMS
James K. Linn and Gerald C. Stoker Jan. 1983 32 p refs
(Contract DE-AC04-76DP-00789)
(DE83-005968; SAND-82-2327) Avail: NTIS HC A03/MF A01

A radiometric mass flowmeter for two-phase solid-gas streams was developed and tested in a coal cold flow test loop. Mass flow was obtained as a product of density and particle velocity. These were measured by X-ray absorption and time cross-correlation values were obtained for sensor separation distances out to one meter; no orientation dependence was observed. Coal volumetric density uncertainties of plus or minus 6% were obtained. DOE

N83-26054# European Space Agency, Paris (France).
RESONATOR STABILIZATION, DATA ACQUISITION AND COMPUTING ON A LASER GYRO
Gerald Siol Mar. 1983 94 p refs Transl. into ENGLISH of "Resonanzraum-Stabilisierung, Messwert-Erfassung u. -auswertung am Laserkreisel', Rept. DFVLR-Mitt-81-15, DFVLR, Brunswick (West Germany), Apr. 1981 Original report in GERMAN previously announced as N82-23529
(ESA-TT-754; DFVLR-Mitt-81-15) Avail: NTIS HC A05/MF A01; original German version available from DFVLR, Cologne DM 17,50

In order to make the resonator length of the laser gyro insensitive to thermal or mechanical perturbations, a control loop, consisting of piezodrive, optical sensors, readout electronics, and phase sensitive demodulation was developed. Assembly and circuit components are described. Test results indicate excellent perturbation suppression for frequencies below 1 Hz. The acquisition system for the data of the stabilized gyro consists of a multichannel analyzer, floppy disk unit, and controller. Data processing programs in FORTRAN, BASIC and Assembler are given. The system is shown to be particularly useful for large data series and day-to-day measurements. Author (ESA)

N83-26055# National Bureau of Standards, Washington, D.C. National Engineering Lab.
COMPUTER SOFTWARE FOR MEASUREMENT ASSURANCE OF GAGE BLOCKS Final Report
Ruth N. Varner Oct. 1982 62 p refs
(PB83-139287; NBS-TN-1168) Avail: NTIS HC A04/MF A01 CSCL 14B

This document is intended for those who are interested in computer software needed to provide, on a continual basis, a measurement assurance procedure for calibrating gage blocks where a test set of gage blocks is measured against two standard sets with control being on the difference of the two standards. A thorough discussion is given of the software including its implementation and usage. A hard copy or a magnetic tape of the software is available on request. GRA

N83-26213# European Space Agency, Toulouse (France). Earth Observation Program Office.
THE ACTIVE MICROWAVE INSTRUMENT (AMI) FOR ERS-1
A. Haskell *In its* Radar Calibration Feb. 1983 p 133-140 refs
(For primary document see N83-26202 15-43)
Avail: NTIS HC A09/MF A01

36 LASERS AND MASERS

Includes parametric amplifiers.

N83-26056# Harry Diamond Labs., Adelphi, Md.
NUMERICAL CALCULATION OF THE PROPAGATION OF SPATIAL COHERENCE FROM PARTIALLY COHERENT SOURCES
Theodore H. Hopp and Dennis McGuire Oct. 1982 66 p refs
(DA Proj. 1L1-161102-AH-44)
(AD-A123243; HDL-TR-1979) Avail: NTIS HC A04/MF A01 CSCL 12/1

This report considers the numerical calculation of the mutual intensity function of highly coherent laser radiation after reflection from a surface having roughness on the scale of the laser wavelength and at arbitrary distances from the reflector. The mutual intensity function characterizes the second-order spatial coherence properties of the nearly monochromatic reflected field and is of interest for evaluating the potential of coherent detection schemes for optical fuzing systems. Author (GRA)

N83-26057# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
CHARACTERIZATION OF A PULSED HF OPTICAL RESONANCE TRANSFER LASER M.S. Thesis
Douglas Allen Rudd Oct. 1982 101 p refs
(AD-A124708; AFIT/FEP/PH/82D-20) Avail: NTIS

HC A06/MF A01 CSCL 20/5

The HF (v=2) vibrational level was pumped optically on the P2(8) transition and P2(7) transition. The 0.5 percent HF in helium gas at 50 torr was pumped by an HF laser with 0.081 joules per pulse and 96 pulses per second. The technique involves observation of absorption by HF (v=2). Decreased absorption was observed on the P2(8) transition implying the possibility of gain by V-V exchange. The data shows conformance with the results of a previous investigation on the P2(8) line. Interrogation of the P2(7) transition failed to yield conclusive results due to a poor signal to noise ratio. A theoretical model of the kinetics of the HF V-V and V-T exchanges was established. Pulse shapes predicted by this theory and those observed experimentally for the P2(8) line agree well. Excessive noise levels precluded investigation of other transitions. Author (GRA)

N83-26058# Naval Research Lab., Washington, D. C.

X-RAY SPECTROSCOPY TO DETERMINE LINE COINCIDENCES

P. G. Burkhalter, G. Charatis, and P. Rockett 31 Jan. 1983 44 p refs

(RR0120241)

(AD-A124641; NRL-MR-5022) Avail: NTIS HC A03/MF A01 CSCL 20/5

X-ray spectroscopy in the 12-15 A region of L-shell lines from selected transition elements was performed in a joint Naval Research Laboratory - KMS Fusion, Inc. experiment. The accurate wavelengths determined in this work will be utilized in selecting potential pumping candidates in future X-ray lasing schemes. Specifically, high-resolution X-ray spectra were collected under controlled geometric and target conditions using both red and green light laser excitation in the KMS Chroma laser. Three groups of X-ray spectra were collected with highly-dispersive X-ray crystals at wavelengths centered at 12.543, 13.781 and 14.458 A corresponding to He- and H-like lines from fluorine. Two specially-designed flat crystal spectrographs employing film shutters were used with pairs of beryl and TAP crystals. The spectra from potential lasant and pump candidates could be recorded on the same spectrogram to aid in identifying X-ray line coincidences. In cases where wavelengths were measured in both the red and green laser work, agreement within 1-3 mA was obtained for the L-series X-ray lines. Within this accuracy range, five L series X-ray lines, mostly 2p-3d transitions from the metals Cr, Mn, and Ni, had wavelength values coincident to K-series lines in fluorine. Author (GRA)

N83-26059# Stanford Univ., Calif. High Energy Physics Lab.

LASER INDUCED BUNCH LENGTHENING ON THE ACO STORAGE RING FEI

Kem Edward Robinson, David A. G. Deacon, Michel F. Velghe, and John M. Madey Sep. 1982 12 p refs

(Contract F49620-80-C-0068)

(AD-A124552; HEPL-910) Avail: NTIS HC A02/MF A01 CSCL 20/7

Laser induced bunch lengthening has been measured on the ACO storage ring FEL. The experimental data at low current generally confirms the existing theoretical models, while the high current data is dominated by anomalous effects. As part of the LURE/Stanford Free Electron Laser Project at Orsay, France, we have developed a sensitive method to measure the laser induced change in the electron bunch length. This method is capable of measuring the absolute bunch with a precision of 1%, and fractional changes in electron bunch length as small as 1 part in 100,000. Using this system, we have measured the steady state and time dependent laser induced bunch lengthening as a function of electron current, external laser intensity, RF cavity voltage, the undulator magnetic field, and the detection frequency. GRA

N83-26060# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

INVESTIGATION OF THE FEASIBILITY OF USING LASER INDUCED FLUORESCENCE FOR CONCENTRATION MEASUREMENTS BY DIATOMIC SULFUR M.S. Thesis

William D. Harris, Jr. Dec. 1982 110 p refs

(AD-A124760; AFIT/GEP/PH/82D-10) Avail: NTIS HC A06/MF A01 CSCL 07/4

The feasibility of using laser induced fluorescence to measure total S2 number densities in a laboratory environment is studied. A rate equation analysis modeling transitions within the B to the 3rd power negative summation u-to the 3rd power negative summation g system of S2 is developed and applied to model the frequency prime = 9, frequency double prime = 6 transition at 3214.6 angstroms. Excitation spectra were obtained over the range of 2890 to 2810 angstroms clearly showing the frequency double prime = 0, frequency prime = 8 and frequency double prime = 0, frequency prime = 9 absorption bands. Fluorescence scans of the frequency prime = 8, frequency double prime = 1 through 24 and frequency prime = 9, frequency double prime = 1 through 25 were taken. After these broad spectra were identified, further investigations of the frequency prime = 9, frequency double prime = 6 transition included fluorescence intensity versus temperature, laser power, and pressure. Additional measurements of quenching, radiative lifetime and self absorption are made. GRA

N83-26061# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

OPTIMIZATION OF A He-Xe HOLLOW CATHODE DISCHARGE LASER M.S. Thesis

Jimmy C. Mann Dec. 1982 80 p refs

(AD-A124768; AFIT/GEP/PH/82D-18) Avail: NTIS HC A05/MF A01 CSCL 20/5

This work investigates the characteristics of a fixed geometry hollow cathode discharge laser containing various pressures and mixtures of helium (He) and xenon (Xe). The laser oscillates at an infrared wavelength of 3.507 micrometers. Power from three output couplers using mixtures of 2.5% to 20% Xe at pressures of two to eight torr are investigated. The output power is measured as a function of mixture, pressure, and output coupler. A 'modes of operation' model is developed to explain the variations in the curves for power vs anode current. The symmetric mode of operation is characterized by equivalent voltages driving the three anodes at the same current. The asymmetric mode of operation is characterized by the same currents being driven by different voltages, hence the asymmetry. The non-equal current (NEC) mode of operation is characterized by at least one of the anodes being driven at a different current. The results of the investigation reveal a maximumpower of 1.16 mw with 10% Xe at 4 torr of pressure with an anode current of 27 m amps. Evidence is also presented that the asymmetric and NEC modes of operation can provide additional power after the symmetric mode has saturated. Author (GRA)

N83-26062# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

ENHANCED IMAGE TRACKING: ANALYSIS OF TWO ACCFLERATION MODELS IN TRACKING MULTIPLE HOT-SPOT IMAGES M.S. Thesis

Mark R. Kozemchak Dec. 1982 545 p refs

(AD-A124781; AFIT/GEO/EE/82D-4) Avail: NTIS HC A23/MF A01 CSCL 17/7

Two extended Kalman filter algorithms that estimate target position, velocity, and acceleration, as well as atmospheric jitter are developed for use within a laser weapon system. Digital signal processing techniques are employed on data obtained from a forward looking infrared (FLIR) sensor in order to identify the underlying shape of multiple hot-spot targets. No a priori information is assumed about such images. The identified shape is used in the measurement model portion of the extended Kalman filters in order to estimate target position offsets from the center of the sensor field of view. The two dynamics models incorporated within the filters are 1) a first order Gauss-Markov acceleration model and 2) a constant turn-rate acceleration model. Performance of these two filters are compared in tracking scenarios involving constant G and constant roll-rate maneuvers. Extensive consideration is given to simulating realistic multiple hot-spot images on the FLIR image plane. Performance of a previously developed

adaptive filter is shown to be seriously degraded when faced with multiple hot-spot images since it assumes a priori information about the target image. GRA

N83-26063# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
INFLUENCE OF PERIODIC COMPRESSIBLE VORTICES ON LASER BEAM INTENSITY M.S. Thesis
Craig P. Weston Dec. 1982 84 p refs
(AD-A124756; AFIT/GAE/AA/82D-32) Avail: NTIS HC A05/MF A01 CSCL 20/5

This study explored the effect of narrow-band, vortex-induced density fluctuations on the beam quality of a laser propagated through the fluctuating flow. The research was a dual investigation. First, the ability to create and characterize 'tailored', fluctuating flows was explored. Second, the degradation of the laser beam due to these various flows was assessed. The flows of periodic vortices were created by cylindrical rods placed at the exit plane of a 1 cm by 10 cm rectangular free jet issuing air at M = .6. Reynolds number based on rod diameter varied from 4,600 to 110,000. Mean and fluctuating mass flux, total pressure and static pressure time histories of the flows were measured in order to derive fluid eddy passage frequency, eddy length and periodic density fluctuation data. Schlieren photographs were obtained for further assessment of the flow fields. A nominal 1 mW laser beam was propagated at two wavelengths transversely through the periodic portion of each flow. The far field beam cross-section was analyzed to determine beam intensity degradation. A Strehl ratio for each flow field was deduced from pseudo-quantitative data. GRA

N83-26064# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DEPENDENCE OF PULSED LASER-INDUCED DAMAGE TO OPTICAL SURFACES ON THE SPECIES AND PRESSURE OF AN AMBIENT GAS M.S. Thesis
John A. Kardach Dec. 1982 56 p refs
(AD-A124718; AFIT/GEP/PH/82D-16) Avail: NTIS HC A04/MF A01 CSCL 20/5

The testing of optical materials in electronegative gases was investigated to determine if an increase in the resistance of the material to pulsed laser-induced damage could be realized as indicated by the Soviet literature. The materials were irradiated with a 1.06 micrometer laser pulse of 5 nsec and a spot size (1/e squared-radius) of 148 micrometer. The materials used for testing consisted of zirconium oxide dielectric thin films (lambda/2 at 1.06 micrometer), copper mirrors, fused silica substrates, Hoya's ARG-2 Glass, and porous sol-gel drived coatings. Each material was tested in environments of nitrogen tetrafluoromethane and sulfur hexafluoride for pressures ranging from less than 10 to the minus 5th power torr to 600 torr. The results indicated that the energy density damage was unaffected by the type or pressure of the gas surrounding the material for single shot damage testing. GRA

N83-26065# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
MEASUREMENT OF BARIUM EVAPORATION FROM A DISPENSER CATHODE USING LASER-INDUCED FLUORESCENCE M.S. Thesis
Eugene Francis Kasper Dec. 1982 67 p refs
(AD-A124727; AFIT/GEO/PH/82D-5) Avail: NTIS HC A04/MF A01 CSCL 09/1

The rate of evaporation of barium atoms from a thermionic dispenser cathode is measured as a function of cathode temperature and operating time using laser-induced fluorescence techniques. A continuous wave dye laser is tuned to the 5535 A barium I transition, the laser beam is aimed over an operating cathode, and the resulting fluorescence is measured using photon counting techniques. The evaporation rate is then calculated from the measured fluorescent intensity. The results indicate that for the Semicon type S cathode under test the evaporation rate increases until the cathode temperature reaches 1200 K, above which the rate decreases, possibly due to self absorption of the fluorescent photons inside the test cell. The lifetime data indicates that, after a high evaporation rate for the first 30 hours of operation, the evaporation rate decreases and becomes approximately constant at 7.11 x 10 to the 9th power atoms/sec for the 420 hour duration of the lifetime test. The cathode heater failed at 430 hours. Author (GRA)

N83-26066# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DESIGN AND DEVELOPMENT OF A LASER WAVEMETER M.S. Thesis
Harry W. Ladewig Dec. 1982 84 p refs
(AD-A124759; AFIT/GEO/PH/82D-7) Avail: NTIS HC A05/MF A01 CSCL 20/5

The purpose of this thesis project is to design and fabricate a wavemeter suitable for measuring the wavelength of visible, continuous wave laser emissions. After a review of the literature, a moving-arm Michelson interferometer was selected as the basis for the wavemeter. A twice folded path is used in the moving arm and electronic fringe rate multiplication is used in the counting circuit to improve system accuracy without increasing its overall size. A Z-80 based microcomputer is incorporated in the system for control and calculation purposes. Its use allows corrections to be made for the dispersion of air when the vacuum wavelength is calculated. Constraints on the wavemeter subsystems are derived from the basic design specifications. A description of the final design, including detailed information on the air rail, the fringe counting circuits, and the wavelength calculation algorithms, is presented. The portions of the wavemeter that were constructed are evaluated in regard to how well they meet the design specifications. Problems in stabilizing the detected fringe signals prevented completion of the wavemeter. Recommendations are made concerning additional work that must be done to complete its fabrication. GRA

N83-26067# Dunfermline (Scotland).
A LASER BASED DISTORTION MEASURING SYSTEM
J. C. Brown Aug. 1982 30 p refs
(AD-A124577; AMTE(S)-TM-82450; DRIC-BR-84191) Avail: NTIS HC A03/MF A01 CSCL 20/5

The collapse characteristics of structures under compressive loading are very dependent on deviations from perfect geometry. As computer based structural analysis has improved, increased account has been taken of the effect of initial imperfections and a need has developed for surveying structures to quantify the distortions which are present. The need for such data for ship structures has prompted the development of a method of measuring distortions which uses a laser beam to define a straight line from which measurements can be taken. The system described provides an efficient means of measuring and recording deviations form straightness or flatness of structures at 2 cm intervals in lengths of up to 2 metres, with an accuracy of about 0.5 mm under suitable lighting conditions. The magnetic tape cartridges produced by the data logger can be read into a mini computer to provide a graphic representation of the distortions present and to provide input data for structural analysis programs. The system may also be used for recording indentation damage such as in oil rig legs or submarine models and could be used over short arc lengths to provide data for determining deviations from round. GRA

N83-26068# Naval Surface Weapons Center, Dahlgren, Va. Combat Systems Dept.
ANALYSIS TECHNIQUES FOR AIRBORNE LASER RANGE SAFETY EVALUATIONS Final Report
M. S. Ramsburg, D. L. Jenkins, and R. D. Doerflein Aug. 1982 56 p refs
(AD-A124008; AD-F350009; NSWC/TR-82-57) Avail: NTIS HC A04/MF A01 CSCL 20/5

Techniques to evaluate safety of airborne laser operations on the range are reported. The objectives of the safety evaluations were to (1) protect civilian and military personnel from the hazards associated with lasers, (2) provide users with the least restrictive

constraints in which to perform their mission and still maintain an adequate degree of safety, and (3) develop a data base for the Navy in the event of suspected laser exposure of other related incidents involving military or civilian personnel. A microcomputer code, written in ASNI 77 FORTRAN, has been developed, which will provide safe flight profiles for airborne laser systems. The output of this code can also be used in establishing operating areas for ground based Lasers. Input to the code includes output parameters, NOHD and assigned buffer zone for the laser system, as well as parameters describing the geometry of the range. GRA

N83-26069# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ACTA ELECTRONICA SINICA (SELECTED ARTICLES)

Shaoji Lin, Zhixiang Bao, Guangyuan Gong, Yuncheng Huo, Shizhan Lei, Juping Shu, Shiqing Tang, Yunrong Wei, and Chengen Zheng 10 Dec. 1982 20 p refs Transl. into ENGLISH from Dianzi Xuebao (China), v. 9, no. 5, Sep. 1981 p 70-78

(AD-A123934; FTD-ID(RS)T-0982-82) Avail: NTIS HC A02/MF A01 CSCL 20/5

Test results of an X-ray preionized avalanche discharge laser are presented. In this device, a water dielectric transmission line is employed as the discharge energy source and a multi-arc-channel rail gap switch is used to improve the front edge characteristics of the discharge voltage. Homogeneous discharge lasted about 70 ns in a typical XeCl laser discharge gas of 2 to 5 atm, and XeCl 3080A laser output energy (5 to 6J/1 exceeding 1.2J was obtained in an active volume of 210 cu cm. GRA

N83-26070# Physical Sciences, Inc., Andover, Mass.

STUDIES OF A REPETITIVELY-PULSED LASER POWERED THRUSTER Final Technical Report, 18 Jan. - 18 Aug. 1982

David I. Rosen, N. H. Kemp, and M. Miller Jan. 1982 94 p

(Contract N00014-82-C-0165; DARPA Order 3176)

(AD-A123938; PSI-TR-358) Avail: NTIS HC A05/MF A01 CSCL 21/8

In this report we present results of continuing analytical and experimental investigations carried out to evaluate the concept of pulsed laser propulsion. This advanced propulsion scheme, which has been the subject of several previous studies, involves supplying propellant energy by beaming short, repetitive laser pulses to a thruster from a remote laser power station. The concept offers the advantages of a remote power source, high specific impulse, high payload to total mass ratio (a consequence of the first two features) and moderate to high thrust (limited primarily by the average laser power available). The present research addresses questions related to thruster performance and optical design. In the thruster scheme under consideration, parabolic nozzle walls focus the incoming laser beam to yield breakdown in a propellant at the focal point of the parabola. The resulting high pressure plasma is characteristic of a detonation wave initiation by high power laser-induced breakdown. With a short laser pulse, the detonation wave quickly becomes a blast wave which propagates to the nozzle exit plane converting the high pressure of the gas behind it to a force on the nozzle wall. Propellant is fed to the focal region from a plenum chamber. The laser-induced blast wave stops the propellant flow through the throat until the pressure at the throat decays to the sonic pressure; then the propellant flow restarts. The process is repeated with each successive laser pulse. GRA

N83-26071# Army Missile Command, Redstone Arsenal, Ala. Ground Equipment and Missile Structures Directorate.

RANGE DETERMINATION AND EVALUATION OF LASER SPECKLE INTERFEROMETRY

Terry L. Vandiver, Sandra W. Cameron, Robert N. Evans, and Tom W. Yost 22 Feb. 1982 46 p refs

(AD-A123873; AD-E950340; DRSMI/RL-82-3-TR) Avail: NTIS HC A03/MF A01 CSCL 20/6

The objective of the effort was to determine the range of laser speckle interferometry. An XP-250 epoxy E-glass specimen was illuminated by an optical process utilizing an argon laser as a coherent light source. The displacement was achieved by angular rotation about a reference point. Geometric and trigonometric functions were used to analytically determine magnitudes and directions of displacement. The optical setups and a description of the computer system to analyze the interferogram is also presented. An analytical-experimental comparison of displacements and rotation angle is also included. A statistical analysis including standard deviation and coefficient of variation was utilized. Author (GRA)

N83-26072# Rochester Univ., N. Y. Dept. of Chemistry.

QUANTUM STATISTICAL THEORY OF LASER-STIMULATED SURFACE PROCESSES. PART 2: NONEQUILIBRIUM RATE OF LASER EXCITATION AND MULTIPHONON RELAXATION

Jui-Teng Lin (NRL, Wash., D.C.) and Thomas F. George Jan. 1983 22 p refs Submitted for publication

(Contract N00014-80-C-0472; Grant AF-AFOSR-0046-82; NR Proj. 056-749)

(AD-A124092; UR-DC-82-TR-28) Avail: NTIS HC A02/MF A01 CSCL 20/10

By means of quantum statistical theory, the laser excitation rate and multiphonon relaxation rate are calculated for species adsorbed on cold and heated surfaces. The complex frequency of Bose operators is derived from a microscopic Hamiltonian with anharmonic mode-mode coupling, which provides the origin of the non-Arrhenius form for the multi-phonon relaxation rate. The energy transfer rate due to the interference effects between the coherent laser excitation and multiphonon coupling is calculated. The nonequilibrium energy transfer rate due to the energy feedback of the heated surface is investigated via a self-consistent heat diffusion equation. GRA

N83-26073# Tactical Air Command, Langley AFB, Va.

LASER VECTOR SCORING SYSTEM FEASIBILITY SUPPORT TEST

10 Feb. 1983 9 p

(AD-A125158) Avail: NTIS HC A02/MF A01 CSCL 16/2

The Laser Vector Scoring System (LVSS) was developed to fulfill a missile scoring requirement to recreate a missile's terminal trajectory with respect to the target. The LVSS will be installed on a QF-100D full-scale aerial target (FSAT). The system will be interfaced with the standard telemetry receivers and transmitters currently in use in the QF-100D. LVSS commands and operational status will be via the DTCS data link. Scoring data will be transmitted through the existing scoring telemetry transmitter. Missles to be launched against an LVSS-equipped aircraft will be optically enhanced with stainless steel reflective bands. The refective kits will be designed for use on the AIM-7 series missiles, as well as the AMRAAM. GRA

N83-26074# Imperial Coll. of Science and Technology, London (England).

TIME-DEPENDENT STARK-BROADENING MEASUREMENTS IN PLANAR-LASER TARGET EXPERIMENTS

R. W. Lee, J. D. Kilkenny, R. L. Kauffman (California Univ., Livermore. Lawrence Livermore Lab.), and D. L. Matthews (California Univ., Livermore. Lawrence Livermore Lab.) 9 Jul. 1982 20 p refs Presented at the Spectral Line Shapes Meeting, Boulder, Colo., 12-16 Jul. 1982

(Contract W-7405-eng-48)

(DE82-019117; UCRL-87803; CONF-820732-1) Avail: NTIS HC A02/MF A01

Experiments using a single beam frequency doubled neodymium glass laser irradiating an assortment of planar targets are described. The time dependent Stark broadening of the AL XIII Lyman series lines using a streaked X-ray crystal spectrograph with a temporal resolution of 80 ps were measured. The results were analyzed using a standard line broadening theory which is presented for the high lying Lyman lines. The comparison between the time integrated and time dependent spectral lines is presented. The results illustrate the possibilities now available for characterization of planar target plasmas. DOE

N83-26075# Brookhaven National Lab., Upton, N. Y.
WIGGLER, UNDULATOR, AND FREE-ELECTRON LASER-RADIATION SOURCES DEVELOPMENT AT THE NATIONAL SYMCHROTRON LIGHT SOURCE
H. Hsieh, S. Krinsky, A. Luccio, C. Pellegrini, and A. vanSteenbergen 1982 25 p refs Presented at the Intern. Conf. on X-ray and VUV Symchrotron Radiation Instrumentation, Hamburg, 9-13 Aug. 1982
(Contract DE-AC02-76CH-00016)
(DE82-018059; BNL-31570; CONF-820839-1) Avail: NTIS HC A02/MF A01

An overview is presented of the special radiation sources development at the NSLS for incorporation in a 2.5 GeV X-ray storage ring and a 700 MeV VUV storage ring. This includes a superconducting high field multipole wiggler, lambda/sub c/ = 0.5A; a permanent magnet wiggler, lambda/sub c/ = 2.0A; a maximum photon energy undulator (5 to 7 keV); an undulator for a soft X-ray line or continuum spectrum and a free electron laser source tunable in the 2500 to 4500A region. Source characteristics and status of development are given. In addition, the incorporation of a backscattered Compton photon source is studied and relevant parameters are presented. DOE

N83-26076# California Univ., Livermore. Lawrence Livermore Lab.
HIGH-POWER PULSED LASERS USED IN FUSION RESEARCH
John T. Hunt 1982 14 p refs Presented at US/Japan Seminar on Theory and Appl. of Multiple Ionized Plasmas Produced by Laser and Particle Beams, Nara, Japan, 3-7 May 1982 Submitted for publication
(Contract W-7405-eng-48)
(DE83-006611; UCRL-87230; CONF-820528) Avail: NTIS HC A02/MF A01

The Nd:glass laser target irradiation facilities constructed and operated for fusion research are reviewed. These type of facilities, have resulted in an extremely useful tool for studying many of the plasma physics processes involved in inertial confinement fusion. DOE

N83-26077# European Space Agency, Paris (France).
LASER PROFILOMETER FOR STEREO LINE SCANNER
Christian Werner, Friedrich Koepp, and Friedrich Malota Feb. 1983 45 p refs Transl. into ENGLISH of "Laser-Altimeter zum Stereolinescanner" DFVLR, Oberpfaffenhofen, West Ger. Report DFVLR-Mitt-82-06, Dec. 1981 Original report in GERMAN previously announced as N82-32766
(ESA-TT-777; DFVLR-Mitt-82-06) Avail: NTIS HC A03/MF A01; original German version available from DFVLR, Cologne DM 13,50

A satellite-borne laser altimeter for applications in meteorology, oceanography and geodesy is described. The system parameters, and the weight and power requirements were determined. The system was compared with other planned systems, showing that only the altimeter part with weight of about 300 kg and power requirement of 1 to 5 kw is expensive. Interpretation problems arise with cloud applications. Due to the large power consumption a combined measurement using the WINDSAT experiment is proposed. Author (ESA)

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N83-26078* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
VARIABLE SPEED DRIVE Patent
Henry D. Obler, inventor (to NASA) Issued 26 Apr. 1983 6 p Filed 27 Feb. 1981
(NASA-Case-GSC-12643-1; US-Patent-4,381,174; US-Patent-Appl-SN-238786; US-Patent-Class-417-15; US-Patent-Class-47-26) Avail: US Patent and Trademark Office CSCL 13I

A variable speed drive wherein a first embodiment is comprised of a pivotally mounted prime mover coupled to a rotary fluid output device, such as a fan or pump, through a variable and fixed pulley drive arrangement is described. The pivotal position of the prime mover and accordingly the pitch diameter of variable pulley means is controlled in accordance with fluid motor means coupled to the prime mover. This is actuated in response to a fluid feedback control signal derived from a sensed output of the rotary fluid output device. The pivotal motion of the prime mover imparts an arcuate motion to the variable pulley means which effects a speed variation of the rotary fluid output device in accordance with the variation of the pitch diameter ratio of opposing variable and fixed pulley means.
Official Gazette of the U.S. Patent and Trademark Office

N83-26079*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PIVOTING AND SLIP IN AN ANGULAR CONTACT BEARING
E. Kingsbury 1983 14 p refs Presented at the Joint Lubrication Conf., Hartford, 18-20 Oct. 1983; sponsored by the ASME and American Society of Lubrication Engineers
(NASA-TM-83408; E-1570; NAS 1.15:83408) Avail: NTIS HC A02/MF A01 CSCL 13I

Pivoting slips are calculated for the ball-race and ball-ball contacts in a retainerless bearing. The calculation is kinematic, ignoring all inertial loadings. Pure spin and uniform precession of the balls are considered. Pivoting slip magnitudes are compared with several other kinds of slip which were previously reported in an R4 size bearing. Author

N83-26080*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
DAMPING SEAL FOR TURBOMACHINERY Patent Application
George L. vonPragenau, inventor (to NASA) Filed 28 Apr. 1983 11 p
(NASA-Case-MFS-25842-1; US-Patent-Appl-SN-489902) Avail: NTIS HC A02/MF A01 CSCL 11A

A damping seal between a high speed rotor member and stator member that separates pressurized fluid compartments is described. The rotor member has a smooth outer surface and the stator member has a bore surface roughened by a plurality of pockets or depressions. NASA

N83-26081# Hughes Helicopters, Culver City, Calif.
ULTRASONIC WELD BONDING OF HELICOPTER PRIMARY STRUCTURES Final Report, Sep. 1979 - Jul. 1981
K. K. Niji Dec. 1982 38 p refs
(Contract DAAK51-79-C-0045)
(AD-A124645; USAAVRADCOM-TR-82-D-28; HHI-82-261) Avail: NTIS HC A03/MF A01 CSCL 13/8

This program was a study to develop and optimize an ultrasonic weld bonding procedure for the fabrication of primary structural components for helicopters. This procedure, a combination of ultrasonic welding and adhesive bonding, was studied through a series of coupon tests. Various adhesives and surface treatments were evaluated with regard to their adaptability of ultrasonic weld bonding. Adhesive bond quality and weld quality were evaluated through various T-shear, fatigue, and environmental salt-spray tests. Environmental degradation of the adhesively bonded areas occurred consistently and could not be resolved. It was determined that the surface condition required for good adhesive bonding was not compatible with that required for good ultrasonic welding and the program was terminated. Author (GRA)

N83-26082# Naval Research Lab., Washington, D. C. Environmental Chemistry Branch.
SEA SALT AEROSOL COLLECTOR FOR MARINE TURBINE INLET AIR DUCTS Final Report
J. B. Hoover and T. B. Warner 4 Jan. 1983 21 p refs
(AD-A123863; AD-E000523; NRL-MR-4960) Avail: NTIS HC A02/MF A01 CSCL 13/10

A new design for a sea salt aerosol collector is described. It is specifically intended to collect aerosol samples from marine gas turbine air inlet ducts. Samples are deposited on 13 mm diameter filter membranes suitable for chloride determination using an ion selective electrode technique. The probe allows rapid removal and replacement of filters by ship's personnel. Loaded filters are transported to the measuring laboratory within a filter holder that obviates the need for handling the filters at the collecting site, thus minimizing contamination. GRA

N83-26083# Aerodyne Dallas, Tex.
FUEL CONSUMPTION REDUCTION FOR DIESEL POWER GENERATOR SETS THROUGH THE APPLICATION OF AN ADVANCED TURBOCHARGER OPERATING AT CONSTANT SPEED Final Report, 30 Mar. - 8 Oct. 1982
John R. Arvin Oct. 1982 50 p
(Contract DAAK70-82-C-0070)
(AD-A123846) Avail: NTIS HC A03/MF A01 CSCL 10/2

The objective of the current research is to demonstrate that a 30KW-400Hz precision gen set, equipped with a VATN (variable area turbine nozzles) turbocharger, can comply with DoD gen set transient specifications. Heretofore poor turbocharger transient response (turbo lag) caused the turbocharged, DED gen set to lose frequency beyond acceptable DoD limits during an instantaneous change in load from 0 to full load. Engine operating conditions were calculated using a computer math model. The turbocharger, with controller, was installed on a four cylinder diesel engine and tested at the engine manufacturer's (White Engine Co.) facility. Fuel consumption data was used to further refine the engine math model. Calculations confirmed at least a 9% fuel savings for the 30KW-400Hz gen set. From the effort of this contract, it can be concluded that a DED precision gen set equipped with a VATN turbocharger can comply with DoD transient requirements. GRA

N83-26084# Army Armament Research and Development Command, Aberdeen Proving Ground, Md. Ballistic Research Lab.
RICOCHET AND PENETRATION OF STEEL SPHERES IMPACTING ALUMINUM TARGETS Final Report
John Zook, Wayne Slack, and Bernard Izdebski Feb. 1983 226 p refs Supersedes ARBRL-IMR-736
(DA Proj. 1L1-62618-AH-80)
(AD-A125330; AD-F300199; ARBRL-MR-03243; ARBRL-IMR-736) Avail: NTIS HC A11/MF A01 CSCL 19/4

A test program was conducted to obtain a complete set of penetration data for steel spheres impacting Aluminum Targets. The Striking speed varied in the range of 100-1800 meters/second for two sphere diameters (0.635 and 1.191 cm.), three impact angles (0, 45 and 60 degrees) and three plate thicknesses (0.635, 1.270 and 5.08 or 7.62 cm.). Exit velocity was obtained for the ricochet and the complete penetration regions and the embedment region was determined. Various parameters are tabulated such as crater size, hole size and depth of penetration. GRA

N83-26085# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
EVALUATION OF PUMPS AND MOTORS FOR PHOTOVOLTAIC WATER-PUMPING SYSTEMS
D. Waddington and A. Herlevich Jun. 1982 57 p refs
(Contract DE-AC02-77CH-00178)
(DE82-019163; SERI/TR-214-1423) Avail: NTIS HC A04/MF A01

Two electric, motor driven water pumps were tested in conjunction with a photovoltaic (PV) array that provided the electrical energy to run the pumps. The performance of available, low cost pumping systems powered by PV arrays was evaluated. The performance and cost of these systems were compared with analogous data from similar, higher priced pumps and motors used with many PV wate pumping systems. The two pump systems considered represent production equipment available from U.S. industry and cost less that 50% of equivalent pumps installed with PV pumping systems in the United States and in developing countries. Flow rates, pumping heads, and efficiency were comparable in both test pumps and equivalent pumps. Motor performance when the motor was directly connected to the PV array and loaded with the pump was examined. The conclusion drawn from this experiment is that commercially available, low cost water pump systems will perform satisfactorily when powered by PV arrays. DOE

N83-26086# Westinghouse Electric Corp., Concordville, Pa. Combustion Turbine Systems Div.
HIGH-RELIABILITY GAS TURBINE COMBINED-CYCLE DEVELOPMENT PROGRAM, PHASE 2, VOLUME 1 Final Report
A. M. Vetere Mar. 1982 378 p refs Sponsored by EPRI 2 Vol.
(EPRI Proj. 1176-2)
(DE82-901910; EPRI-CS-2206; CONF-8110147) Avail: NTIS HC A17/MF A01

A gas turbine design with sufficient reliability to be considered for baseload service in a combined cycle plant was developed. A conceptual centerline design for gas turbine and accessories, with reliability as the key parameter was generated. The effort and results of interrelated tasks are described. These tasks include: (1) data and RAM methodology update providing a data base necessary for apportionments; predictions, and design efforts utilizing a representative combined cycle plant; (2) RAM and COE analysis including goal allocation, prediction analysis, guidance/support to perform FMEA analysis, combined cycle plant optimization, component life evaluation, and alternate design solutions as a function of COE; (3) centerline combustion turbine engine design including CT auxiliary systems, advanced CT technology development, CT engine performance analysis, subassembly and component design, and integration of a HI-REL CTCC plant. DOE

N83-26087# Westinghouse Electric Corp., Concordville, Pa. Combustion Turbine Systems Div.
HIGH-RELIABILITY GAS TURBINE COMBINED-CYCLE DEVELOPMENT PROGRAM, PHASE 2, VOLUME 2 Final Report
A. M. Vetere Mar. 1982 449 p Sponsored by EPRI 2 Vol.
(EPRI Proj. 1187-2)
(DE82-903861; EPRI-AP-2321-Vol-2) Avail: NTIS HC A19/MF A01

The feasibility and comparative values of various system concepts that were developed are determined. The definition of research projects and technical data necessary to improve the present market offering of gas turbines to meet the goals as specified was refined. The data based on the reliability performance of present day installations of combined cycles was expanded. Goals were established for reliability, availability, and maintainability (RAM) parameters of the combustion turbine unit, the complete combustion turbine system, and the total combined cycle plant. DOE

N83-26088# Oak Ridge National Lab., Tenn. Engineering Technology Div.
A TECHNO-ECONOMIC ASSESSMENT ON THE UTILIZATION OF SURGE-LEG PUMPS IN COAL LIQUEFACTION
T. B. Conley Jan. 1983 77 p refs
(Contract W-7405-eng-26)
(DE83-005175; ORNL/TM-8406) Avail: NTIS HC A05/MF A01

Conventional reciprocating slurry pumps have experienced numerous failures in coal-liquefaction pilot plants and process development units. The frequency of these failures dictates caution with respect to their use in projected commercial liquefaction facilities. The question was raised of the viability of reciprocating pumps with clean liquid surge legs as an alternative to conventional reciprocating models for use as the primary pumps for dissolver feed and vacuum tower bottoms. In order to evaluate this question, a techno-economic assessment of the adaptability of surge leg pumps' to these applications was performed. The advantages and disadvantages of surge leg pumps were considered and compared to those of the conventional pumps used in the pilot plants and to those projected for use in the commercial plants. The assessment included an examination of the pumps' technical, practical,

and economic viability in liquefaction services and of the design areas where further study is desirable. DOE

N83-26089# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
SOME ASPECTS OF LIQUID-PHASE SINTERING OF ALUMINA Ph.D. Thesis
Philip Lee Flaitz Jan. 1982 84 p refs
(Contract W-7405-eng-48)
(DE82-018616; LBL-13849) Avail: NTIS HC A05/MF A01

An analysis of the interfacial energies associated with a solid-liquid system showed that the possibility of complete wetting of a liquid in a solid microstructure is not necessarily associated with complete wetting at the solid-liquid-vapor interface. This was investigated using a CaO-Al2O3-SiO2 glass on single crystal and polycrystalline aluminas. The absence of complete penetration of grain boundaries was observed in only one alumina, and was attributed to the presence of MgO in solid solution changing the interfacial energies of the alumina. The observation of complete penetration at long times was also shown to be dependent on the volume of liquid available. The wetting behavior of the glass alumina system was extended to sintering, using two types of alumina. The type of alumina was found to have the greatest effect on sintering. With one of the aluminas, it was shown that surface treatments which increases gamma/sub ss/ can lead to enhanced liquid phase sintering. DOE

N83-26090# Sandia Labs., Livermore, Calif.
COMPUTER SIMULATION OF UPSET WELDING
J. R. Spingarn, W. E. Mason, and J. C. Swearengen Apr. 1982 26 p refs
(Contract DE-AC04-76DP-00789)
(DE82-014184; SAND-82-8663) Avail: NTIS HC A03/MF A01

Useful process modeling of upset welding requires contributions from metallurgy, welding engineering, thermal analysis and experimental mechanics. The significant milestones for such an effort are outlined and probable difficult areas are pointed out. Progress to date is summarized and directions for research are offered. With regard to the computational aspects of this problem, a 2-D heat conduction computer code was modified to incorporate electrical heating, and computations were run for an axisymmetric problem with simple viscous material laws and d.c. electrical boundary conditions. In the experimental endeavor, the boundary conditions were measured during the welding process, although interpretation of voltage drop measurements is not straightforward. The ranges of strain, strain rate and temperature encountered during upset welding were measured or calculated, and the need for a unifying constitutive law is described. DOE

N83-26091# National Centre of Tribology, Risley (England). European Space Tribology Lab.
INVESTIGATION OF TORQUE ANOMALY IN OSCILLATING PDM BEARINGS
M. J. Todd Paris ESA May 1981 31 p refs
(Contract ESTEC-3885/79/NL-PP)
(ESA-ESTL-49; ESA-CR(P)-1695) Avail: NTIS HC A03/MF A01

Progressive torque increase (blocking) in the Space Telescope Solar Array primary deployment mechanism (PDM) bearings was investigated. The motion of the bearings was oscillatory, over 90 deg of arc. Bearing materials, lubricant, cage, form errors, hardness of rings and angle of arc were eliminated as causes. Comparative tests with lower conformity, but otherwise similar, bearings show that mounting errors are the basic reason for the blocking. Both angular misalignment and radial misalignment of the bearing rings induce the effect. It is suggested that differential ball creep occurs in the ball set whose elements move at different velocities because of misalignment. Measures to overcome the effect include good alignment of mounted pairs; paying particular attention to angular alignment so that no scribe marks are left on mating ring faces; use of a high precision bearing (ABEC7 as a minimum) a light, flexible preload; and, if feasible from stress considerations use of a low conformity bearing. Author (ESA)

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N83-26092# International Harvester Co., Hinsdale, Ill. Science and Technology Lab.
ULTRASONIC INSPECTION AND FATIGUE EVALUATION OF CRITICAL PORE SIZE IN WELDS Final Technical Report, 16 Aug. 1976 - 30 Nov. 1979
Clarence J. Carter, John J. Connelly, and Raymond A. Cellitti Watertown, Mass. Army Materials and Mechanics Research Center Sep. 1981 93 p refs
(Contract DAAG46-76-C-0058)
(AD-A124668; AMMRC-TR-80-35) Avail: NTIS HC A05/MF A01 CSCL 13/5

Controlled amounts of weld porosity were introduced into double-vee butt weld joints of low-alloy, high strength structural steel using a gas metal arc weld method. The weld zones were inspected radiographically and ultrasonically to detect and classify porosity severity. Subsequent uniaxial fatigue tests indicated that mean fatigue life of water clear weld was superior to the mean fatigue life of weldments of all pore sizes. Fracture toughness (KIC) as measured by Charpy impact under dynamic loading was noted to improve with weld specimens containing fine pores (0.024 inch diameter and under). GRA

N83-26093# California Univ., Berkeley. Operations Research Center.
A MODEL IN WHICH COMPONENT FAILURE RATES DEPEND ON THE WORKING SET
Sheldon M. Ross Sep. 1982 16 p refs
(Grant AF-AFOSR-0122-81; AF Proj. 2304)
(AD-A124430; OC-82-11) Avail: NTIS HC A02/MF A01 CSCL 12/1

The authors consider a multicomponent system in which the failure rate of given component at any time depends on the set of working components at that time. Sufficient conditions are presented under which such a system has a new better then used life distribution. When the failed components are allowed to be repaired, they present conditions under which the resulting process is time reversible. GRA

N83-26094# Sandia Labs., Albuquerque, N. Mex. Computer Applications Div.
IMAGE ANALYSIS OF THE FRACTURE SURFACE OF AND INERTIA-WELD JOINT
Hilary D. Jones May 1982 9 p
(Contract DE-AC04-76DP-00789)
(DE82-018555; SAND-82-8217) Avail: NTIS HC A02/MF A01

Several methods that were used to analyze images of an inertial weld joint are described. In the inertia weld method, one of the materials to be welded is spun rapidly relative to the other. When the materials are forced into contact, the heat generated by friction combines with the pressure to produce a solid state weld. To assess the quality of the welded joint, it is broken apart and images are prepared of the fractured surface. The criterion used to identify a good weld is that the fracture should occur in the weaker of the two materials, rather than in the bond. This is evaluated by measuring the area of the fracture in the weaker material as a fraction of the total area. The method of determining the area depends on how the image is prepared - by conventional photography or by electron photomicrography - but the areas obtained using the different images are in good agreement. However, conventional photographs are much easier to deal with than photomicrographs. DOE

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N83-26095 British Aerospace Dynamics Group, Stevenage (England). New Project Studies Dept.
THE TENSILE STRENGTH AND TESTING OF OPTICAL FIBERS
M. D. Jones Jan. 1982 23 p refs
(BAe-ST-25941) Avail: Issuing Activity

The failure mechanism in optical fibers, the effects of fiber length and the effect of storage over long periods are discussed. The advantages of surface coatings proof testing and reinforcement of the fiber are examined. Nondestructive methods of testing the fiber during manufacture are outlined. Optical techniques look most promising and acoustical techniques appear less promising. Author (ESA)

N83-26096# Technion - Israel Inst. of Tech., Haifa. Dept. of Aeronautical Engineering.
NONDESTRUCTIVE DETERMINATION OF INTERACTION CURVES FOR BUCKLING OF STIFFENED SHELLS
H. Abramovich, J. Singer, and A. Grunwald Dec. 1981 52 p refs
(TAE-341) Avail: NTIS HC A04/MF A01

The vibration correlation technique for definition of boundary conditions was employed as a nondestructive method to obtain improved interaction curves for stringer-stiffened cylindrical shells under combined axial compression and external pressure. Seven integrally stiffened shells were tested, three shells nominally clamped and four on nominal simple supports. The method of repeated buckling for derivation of interaction curves was also studied, and the preferable sequence of loading was found.Author

N83-26097# Lehigh Univ., Bethlehem, Pa. Center for Materials Research.
EFFECT OF FREQUENCY ON FATIGUE CRACK PROPAGATION IN SHORT-GLASS-FIBER-REINFORCED NYLON 66
Reinhold W. Lang, John A. Manson, and Richard W. Hertzberg Dec. 1982 26 p refs Submitted for publication
(Contracts N00014-77-C-0633; N00014-77-C-1234; NR Proj. 356-670)
(AD-A124157; TR-11) Avail: NTIS HC A03/MF A01 CSCL 20/11

The fatigue crack propagation (FCP) response of nylon 66 and composites containing 16 and 31 vol. % short glass fibers was determined at frequencies of 1, 10, 50, and 100 Hz. The sensitivity to frequency was found to depend on glass content and, in the case of the pure matrix, on the value of the stress intensity factor range, delta K. Whereas both glass-reinforced compositions were superior to the pure matrix material, an inversion in relative ranking of the former occurred as the cyclic frequency was changed. Also, the strong frequency sensitivity revealed by nylon 66 at low delta K values disagrees with results reported previously. To explain these phenomena a concept based on the competition between localized and more generalized heating is proposed. Author (GRA)

N83-26098# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THE HIGH TEMPERATURE VISCOPLASTIC FATIGUE BEHAVIOR OF A COMPACT TENSION SPECIMEN USING THE BODNER-PARTOM FLOW LAW M.S. Thesis
James E. Keck Dec. 1982 120 p refs
(AD-A124682; AFIT/GAE/AA/82D-17) Avail: NTIS HC A06/MF A01 CSCL 11/6

Few studies have been made concerning the effects of low cycle fatigue on the stress/strain field or the plastic zone size ahead of a crack tip in a high temperature environment. Experiments using a superalloy IN-100 at 732 C have shown crack growth during fatigue is slower than the growth rate during long periods of sustained load. These investigations also show that crack growth rates during hold periods after fatigue cycling are dependent on the cycle frequency. This study focuses on fatigue as it effects the changing stress field and plastic zone ahead of a crack tip. Finite element modeling was accomplished using an in-house computer program named VISCO, which was modified to incorporate load cycling. A compact tension specimen geometry was modeled using the Bodner-Partom viscoplastic constitutive equations to describe the material behavior. Results show that material behavior near a crack tip closely correlates to uniaxial material response data under stress controlled loading. During cyclic loading, the greatest plastic deformation near the crack tip occurs in the first load cycle. Computations show that IN-100 displays significant amounts of time dependent inelastic behavior. GRA

N83-26099# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
STATIC AEROELASTIC ANALYSIS OF FLEXIBLE WINGS VIA NASTRAN, PART 1 M. S. Thesis
Kim Jones Dec. 1982 97 p refs
(AD-A124662; AFIT/GAE/AA/82D-16-Pt-1) Avail: NTIS HC A05/MF A01 CSCL 01/3

The purpose of this study was to expand the capabilities of the Static Flexible Wing Aeroelastic Sequence that Captain Lance P. Chrisinger developed for NASTRAN as his Master's Thesis at AFIT. Captain Chrisinger developed a basic procedure to enable NASTRAN to analyze flexible wing airloads and stresses. That capability is expanded to enable analysis of standard wing models. A subroutine was incorporated into NASTRAN to eliminate extensive hand-calculation of transformation matrices. The capability to tolerate control surfaces was discovered. Also, a survey of wing models in the Air Force inventory was taken to determine the characteristics of the average wing model. This was used to determine where the aeroelastic procedure was lacking in its ability to analyze wing models. Author (GRA)

N83-26100# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ANALYTICAL/EXPERIMENTAL LINEAR BIFURCATION OF CURVED CYLINDRICAL COMPOSITE PANELS M.S. Thesis
John S. Hebert Dec. 1981 107 p refs
(AD-A124664; AFIT/GAE/AA/82D-14) Avail: NTIS HC A06/MF A01 CSCL 13/13

The Buckling Loads of 8-ply unstiffened (Graphite-Epoxy) cylindrical panels were determined experimentally. The results were compared to the linear bifurcation loads as determined by the STAGSC-1 Computer Code. The analysis included three different ply orientations, five different aspect ratios, and one set of boundary conditions; clamped along the top and bottom curved edges and simply supported along the vertical edges. Author (GRA)

N83-26101# Illinois Univ., Urbana. Coordinated Science Lab.
ESTIMATED THREE-DIMENSIONAL MOTION PARAMETERS OF A RIGID PLANAR PATCH
R. Y. Tsai and T. S. Huang 12 Nov. 1981 107 p refs
(Contract N00014-79-C-0424; Grant NSF MCS-78-18906)
(AD-A124669; R-922; UILU-ENG-81-2253) Avail: NTIS HC A06/MF A01 CSCL 12/1

We present a new direct method of estimating the three-dimensional motion parameters of a rigid planar patch from two time-sequential perspective views (image frames). First, a set of 8 pure parameters are defined. These parameters can be determined uniquely from the two given image frames by solving a set of linear equations. Then, the actual motion parameters are determined from these pure parameters by a method which requires the solution of a 6th-order polynomial of one variable only, and there exists a certain efficient algorithm for solving a 6th-order polynomial. Aside from a scaling factor for the translation parameters the number of real solutions never exceeds two. In the special case of three-dimensional translation, the motion parameters can be expressed directly as some simple functions of the 8 pure

parameters. Thus only a few arithmetic operations are needed.
Author (GRA)

N83-26102# Northwestern Univ., Evanston, Ill. Structural Mechanics Lab.
CRACK GROWTH UNDER PLANE STRESS CONDITIONS IN AN ELASTIC PERFECTLY-PLASTIC MATERIAL Interim Report
J. D. Achenbach and V. Dunayevsky Dec. 1982 25 p refs
(Contract N00014-76-C-0063)
(AD-A124479; NU-SML-TR-82-2) Avail: NTIS HC A02/MF A01 CSCL 20/11

Mode-I crack growth under conditions of generalized plane stress has been investigated. It has been assumed that near the plane of the crack in the loading zone, the simple stress components corresponding to a central fan field maintain validity up to the elastic-plastic boundary. By the use of expansions of the particle velocities in the coordinate y, and by matching of the relevant stress components and particle velocities to the dominant terms of appropriate elastic fields at the elastic-plastic boundary, a complete solution has been obtained for e(y) in the plane of the crack. The solution is valid from the propagating crack tip up to the moving elastic-plastic boundary. A self-similar crack nucleating at a point and steady-state crack propagation have been considered as special cases. GRA

N83-26103# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
STRUCTURAL MODEL TUNING VIA VECTOR OPTIMIZATION M.S. Thesis
Charles Robert DeVore Dec. 1982 82 p refs
(AD-A124791; AFIT/GAE/AA/82D-8) Avail: NTIS HC A05/MF A01 CSCL 13/13

This report examines tuning a finite element model using vector optimization techniques. Structural models using finite element theory often need to be adjusted so they can accurately simulate the real structure. The goal is to tune the model such that it will reproduce data derived from the structure. The tuning procedure is complicated by many factors. First of all, the model may be required to reproduce several sets of different performance data which may have conflicting effects on the model. The number and kinds of parameters to modify may be large or uncertain. Also, there may be many constraints on the model. With all these considerations and several performances indices to extremize, there may be many compromise solutions to examine in order to select the best one. Therefore, the problem has been broken into two parts. First, the performance indices are extremized using multiple objective optimization theory, producing a set of possible solutions. Next, the solutions are ranked ordered according to a decision maker's preferences. The solution ranked number one is, then, the best answer. The tuning process was applied to a T-38 horizontal stabilator. Four static deformation and two natural frequency experimentally determined data sets were used as the objective functions for the three parameter model. GRA

N83-26104# Admiralty Marine Technology Establishment, Teddington (England).
THE EFFECT OF UNIFORM FLOW ON THE DYNAMICS AND ACOUSTICS OF FORCE-EXCITED INFINITE PLATES
D. J. Atkins Dec. 1982 56 p refs
(AD-A124576; AMTE(N)-TM-82087; DRIC-BR-86583) Avail: NTIS HC A04/MF A01 CSCL 13/10

Formulae are obtained for the time-harmonic steady-state plate displacement, acoustic pressure and particle velocities. The far-field pressure is obtained from a stationary phase approximation, and two separate formulations are used to define a time-averaged acoustic intensity vector. The stability of a line-excited plate is examined using both a steady-state approach and a casual approach which is able to distinguish between absolute and convective instability. Some numerical results are presented for a steel plate vibrating in water. The far-field pressure is not significantly affected by flow speeds of a practical magnitude. The very low-frequency acoustic intensity vectors at the plate surface are affected considerably, but at higher frequencies there is no significant effect. At low flow speeds a convective instability is found and at higher flow speeds there is an absolute instability.
Author (GRA)

N83-26105# Lehigh Univ., Bethlehem, Pa.
FATIGUE CRACK PROPAGATION IN AMORPHOUS POLY(ETHYLENE TEREPHTHALATE)
Alvaro Ramirez, John A. Manson, and Richard W. Hertzberg Dec. 1982 26 p refs
(Contracts N00014-77-C-0633; N00014-77-C-1234)
(AD-A124143; TR-13) Avail: NTIS HC A03/MF A01 CSCL 20/11

Earlier studies of fatigue crack propagation (FCP) in polymers have shown a general superiority of crystalline relative to amorphous polymers in terms of FCP resistance. In order to study in detail the effect of crystalline content and character on FCP rates, Poly(ethylene terephthalate) (PET) was selected as a convenient material in which a wide range of crystallinity can be obtained. In order to provide a base-line for comparison, FCP rates were determined for essentially amorphous polymers covering a range of molecular weight. Surprisingly, the essentially amorphous PET turned out to be as resistant to FCP as the best crystalline polymers so far observed. In this paper, several observations about FCP rates and fracture topography are reported: FCP rates agree well with the Paris equation over a wide range of delta K; in any case, the higher the molecular weight, the greater the crack growth resistance according with the Manson-Hertzberg relationship previously established. Fracture surface analysis revealed evidence of softening and drawing, and extensive plastic and shear deformation. GRA

N83-26106# Lehigh Univ., Bethlehem, Pa.
DYNAMIC MECHANICAL SPECTROSCOPY USING THE AUTOVIBRON (DDV-III-C)
S. M. Webler, John A. Manson, and R. W. Lang Dec. 1982 37 p refs
(Contracts N00014-77-C-0633; N00014-77-C-1234)
(AD-A124138; TR-14) Avail: NTIS HC A03/MF A01 CSCL 14/2

The Autovibron DDV-IIIC (IMASS, Inc.) is a forced vibration unit capable of operating at several constant frequencies for the determination of the dynamic mechanical response of a system. The automation provides a programmed heating rate, continuous sample tensioning, and acquisition and reduction of data. Problems have been encountered with sample alignment, tension adjustment and the measurement of low tan delta values. Results obtained at several frequencies using the Autovibron for MBS-modified and unmodified PVC samples and a commercially available mineral-reinforced nylon composite (Minlon 12T, duPont) are reported. It is concluded that this instrument has good potential for the convenient determination of dynamic spectra of polymers and their composites. Author (GRA)

N83-26107# Iowa Univ., Iowa City. College of Engineering.
OPTIMIZATION OF FORCE BALANCING MECHANISMS
Doo Y. Jo, Edward J. Haug, and Ronald R. Beck Warren, Mich. Army Tank Automotive Command Mar. 1982 45 p refs
(Contract DAAK30-80-C-0042)
(AD-A124101; U-OF-IOWA-81-6; TACOM-TR-12643) Avail: NTIS HC A03/MF A01 CSCL 20/11

A theory and computer code for design optimization of force-balancing mechanisms is developed. The force-balancing mechanisms treated in this report use linear elastic force elements. A constrained, multi-element formulation is introduced to analyze kinematics of mechanisms. Two joint formulations, revolute and translational, are introduced. The optimal design problem is formulated as a descretized problem. The objective of the optimization problem is to minimize the largest force required to move the mechanism through its path. A gradient projection method is adopted for optimization. Example calculations are presented for a mechanical spring Weapon Equalibrator. A substantial reduction (60%) of the cost function is demonstrated, compared with conventional equalibrator design methods. Author (GRA)

N83-26108# Northwestern Univ., Evanston, Ill. Technological Inst.
CRITICAL DAMPING IN CERTAIN LINEAR CONTINUOUS DYNAMIC SYSTEMS
Bruno A. Boley Oct. 1982 13 p refs
(Contract N00014-75-C-1042)
(AD-A124113; TR-1982-1) Avail: NTIS HC A02/MF A01 CSCL 13/13

The most commonly used formulas for the analysis of fiber-reinforced and laminated beams are those given by the familiar 'law of mixtures'. In their most general form, these formulas are derived by the methods of elementary strength-of-materials theory, on the basis of the Bernoulli-Euler assumptions. In general, of course, these formulas are only approximate: for example, when calculating the deflection of the simplest type of laminated beam, namely a sandwich, it is known that the inclusion of the effect of shear is essential. Because of their simplicity, however, it is desirable to use them whenever one may do so with sufficient accuracy. It is therefore the purpose of the present work to examine the validity of the simple formulas, and to determine how, and when, they should be corrected. Author (GRA)

N83-26109# New Mexico Univ., Albuquerque. Engineering Research Inst.
EXPERIMENTAL STRESS-STRAIN BEHAVIOR OF A LOW STRENGTH CONCRETE UNDER MULTIAXIAL STATES OF STRESS Final Report
L. A. Traina Kirtland AFB, N. Mex. AFWL Jan. 1983 168 p refs Prepared in cooperation with New Mexico State Univ., Las Cruces
(Contract F29601-81-C-0013; AF Proj. 8809)
(AD-A124062; AFWL-TR-82-92) Avail: NTIS HC A08/MF A01 CSCL 11/2

This report presents the results of a multiaxial experimental investigation using plain concrete cubes subjected to prescribed stress histories and static loading. The results of 81 tests along 27 different load paths are presented as stress-strain plots for each of the three principal directions. Included are load paths with all principal stresses in compression; load paths with one principal stress in tension; and tests to investigate the path dependence of the limit surface for concrete. Author (GRA)

N83-26110# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
VIBROTHERMOGRAPHY: INVESTIGATION AND DEVELOPMENT OF A NEW NONDESTRUCTIVE EVALUATION TECHNIQUE Final Report, 1 Jan. 1979 - 30 Sep. 1982
Edmend G. Henneke, II, Kenneth L. Reifsnider, Wayne W. Stinchcomb, and Samuel S. Russell Jan. 1983 15 p refs
(Contract DAAG29-81-K-0017; Grant DAAG29-79-G-0037)
(AD-A125141; ARO-16202.9-MS) Avail: NTIS HC A02/MF A01 CSCL 14/2

A summary is presented of the major findings of a program whose objective was to investigate the phenomenon of preferential heat generation around damaged regions in materials subjected to mechanical vibrations and to develop an understanding of the mechanisms involved in this process. Vibrothermography is a nondestructive inspection technique based upon the utilization of this phenomenon. It has been found that this technique has much potential for inspecting composite materials. A significant amount of knowledge has been gained concerning the nature of the heat generation process and the relation of the frequency dependence of the heat patterns to the mechanical excitations. Author (GRA)

N83-26111# Washington Univ., Seattle. Dept. of Mechanical Engineering.
NUMERICAL ANALYSIS IN FRACTURE MECHANICS
A. S. Kobayashi Jan. 1983 36 p refs
(Contract N00014-76-C-0060; NR Proj. 064-478)
(AD-A125048; UWA/DME/TR-83/45) Avail: NTIS HC A03/MF A01 CSCL 20/11

Recent developments in four numerical techniques in structural mechanics, which are used to extract fracture parameters for linear elastic, nonlinear and dynamic fracture mechanics, are reviewed. Primary emphasis is placed on the finite element methods for determining two- and three-dimensional (2-D and 3-D) stress intensity factors in linear elastic fracture mechanics. Crack opening displacements (COD) and J-integrals for 2-D, stable growth, ductile fracture, and use of elastic finite element method in its generation mode for obtaining dynamic elastic fracture parameters are discussed. The second topic is the finite difference method for analyzing the elasto-dynamic and elastic-plastic dynamic states in fracturing 2- and 3-D problems. The use of a super finite difference code to study dynamic ductile fracture using the void growth and coalescence model is discussed. The third topic is the boundary element method which has evolved into a practical tool for numerical analysis in 3-D linear elastic fracture mechanics. GRA

N83-26112# Iowa State Univ. of Science and Technology, Ames. Engineering Research Inst.
CREEP BEHAVIOR OF REFRACTORY CONCRETES Annual Report, 1 Oct. 1981 - 30 Sep. 1982
T. D. McGee Dec. 1982 126 p
(Contract W-7405-eng-26)
(DE83-006425; DOE/NBM-83006425; AR-1) Avail: NTIS HC A07/MF A01

The creep of alumina refractory concretes were evaluated and differential transient creep strain of pristine specimens were determined. A mathematical model for the creep behavior of refractory concretes was developed and the creep of commercial refractory concretes, and the effect of fiber reinforcements on the creep of concretes were investigated. The technical progress is described. DOE

N83-26113# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
COMPARISON OF ENVIRONMENTALLY-INFLUENCED NEAR-THRESHOLD FATIGUE-CRACK-GROWTH BEHAVIOR IN HIGH- AND LOWER-STRENGTH STEELS AT CONVENTIONAL FREQUENCIES
R. O. Ritchie, S. Suresh, and P. K. Liaw (Westinghouse Research and Development Center) Jan. 1982 23 p refs Presented at the Eng. Foundation Conf. on Fatigue and Corrosion Fatigue up to Ultrasonic Frequencies, Champion, Pa., 25-30 Oct. 1981
(Contracts W-7405-eng-48; DE-AC03-76SR-0098; DE-AC02-79ER-10389)
(DE82-014992; LBL-13571; CONF-8110183-1) Avail: NTIS HC A02/MF A01

Recent studies in a wide variety of steels, of yield strengths ranging from 290 to 1740 MPa, have indicated that environmental influences on corrosion fatigue crack propagation at near threshold levels (growth rates below approximately .000001 mm/cycle), may be markedly different from those at higher growth rates. The effect of such environments, specifically dry gaseous hydrogen and moist room air, on near threshold cyclic crack growth is reviewed and comparisons made between behavior in high and lower strength steels. It is shown that, in lower strength steels (yield strength $<$ or $=$ to 700 MPa), a near threshold growth rates in dry hydrogen exceed those in moist air by up to two orders of magnitude at low load ratios only, whereas for steels of strength levels above approximately 700 MPa, the presence of hydrogen results in lower near threshold growth rates compared to moist air regardless of load ratio. Such behavior is rationalized in terms of the competing effects of hydrogen embrittlement and oxide induced crack closure mechanisms. DOE

N83-26114# California Univ., Livermore. Lawrence Livermore Lab. Mechanical Engineering Dept.
DYNAMIC RESPONSE OF A THIN DISK SUBJECTED TO A THERMAL PULSE
Clarence A. Calder (Oregon State Univ.) and Ray H. Cornell 6 Aug. 1982 17 p refs Sponsored in part by the U.S. Army
(Contract W-7405-eng-48)
(DE82-020107; UCID-19448) Avail: NTIS HC A02/MF A01

The dynamic response of a thin steel disk to a transient thermal

phase induced by a pulsed neodymium-glass laser was studied experimentally and compared with numerical results from a finite element code. The experiment was designed to provide data for use in code development work for erosion/corrosion studies. DOE

N83-26115# European Space Agency, Paris (France).
MIXED VARIATIONAL PRINCIPLES IN VIBRATIONAL MECHANICS
Philippe Gibert Feb. 1983 265 p refs Transl. into ENGLISH of "Les Principes Variationnels Mixtes en Mecan. de Vibration" ONERA, Paris Report ONERA-NT-1981-4, 1981 Original report in FRENCH previously announced as N82-24513
(ESA-TT-765; ONERA-NT-1981-4) Avail: NTIS HC A12/MF A01

Harmonic vibrations of mechanical systems with nonholonomic constraints are analyzed using a mixed variational formulation for the spectral problem. A connection with methods of the intermediate problem type is established. Numerical bracketing of the natural frequencies of complex structures is treated by calculating an optimal stress associated with the displacement obtained by the primal method. A mixed formulation is used for a static calculation, the data for which are the results from the primal method obtained through calculation of eigenvalues. It is shown that penalization techniques with reduced integration can be applied to vibration problems. Discretization of mixed variational principles by the finite element method increases accuracy for magnitudes which do not appear directly in the displacement principle. A posteriori error estimates for natural modes and frequencies obtained by finite element methods can be deduced. Author (ESA)

N83-26116# European Space Agency, Paris (France).
A DYNAMIC IDENTIFICATION METHOD OF COMPLEX STRUCTURES
Leon Barthe-Batsalle Mar. 1983 89 p refs Transl. into ENGLISH of "Une Methode d'Identification Dyn. de Struct. Complexes" ONERA, Paris Report ONERA-NT-1982-3, 1982 Original report in FRENCH previously announced as N82-31726
(ESA-TT-780; ONERA-NT-1982-3) Avail: NTIS HC A05/MF A01

A global identification method for complex structures, which improves the finite element computation model for the study of harmonic vibrations, based on measured natural modes is outlined. Modes are introduced as displacements imposed on a part of the structure in a static problem involving rigidity and mass operators. The method seeks the unknown parameters which minimize the euclidian norm of the reaction forces corresponding to the prescribed measured displacements. When numerous measured points are spread on the structure, it is possible to localize the modeling errors. Numerical results for a plate and an axisymmetric composite structure are given. Author (ESA)

42 GEOSCIENCES (GENERAL)

N83-26117*# National Aeronautics and Space Administration, Washington, D. C.
GLOBAL GEODYNAMICS
[1982] 15 p Original contains color illustrations
(NASA-TM-85341; NAS 1.15:85341) Avail: NTIS MF A01; SOD HC; also Avail: NASA Scientific and Technical Information Facility, P. O. Box 8757, B. W. I. Airport, Md. 21240 CSCL 08G

Scientists in the United States and in 24 other countries participate in NASA's geodynamics program which applies space-age technology to the study of Earth's shape, dynamics, gravity and magnetic fields, as well as to measurements of crustal movements caused by tectonic processes. Very long base interferometry and laser ranging techniques are described and their use in determining global plate motion, polar motion, Earth rotation, and regional and intraplate deformations is demonstrated. The proposed geopotential mission to provide low altitude surveys of both gravity and magnetic fields, the use of satellites tethered from space shuttle, spaceborne lasers, and the contributions of the global positioning system are ideas for measurement systems to be considered for the next decade. A.R.H.

N83-26118*# National Academy of Sciences - National Research Council, Washington, D. C.
A STRATEGY FOR EARTH SCIENCE FROM SPACE IN THE 1980S. PART 1: SOLID EARTH AND OCEANS Final Report
1982 108 p
(Contract NASw-3482)
(PB83-144121) Avail: NTIS HC A06/MF A01 CSCL 08G

The report develops a ten-year science strategy for investigating the solid earth and dynamics of world oceans from Earth orbit. The strategy begins from the premise that earth studies have proceeded to the point where further advances in understanding Earth processes must be based on a global perspective and that the U.S. is technically ready to begin a global study approach from Earth orbit. The major areas of study and their fundamental problems are identified. The strategy defines the primary science objectives to be addressed and the essential measurements and precision to achieve them. Author (GRA)

N83-26119# Joint Publications Research Service, Arlington, Va.
USSR REPORT: EARTH SCIENCES, NO. 25
14 Apr. 1983 108 p refs Transl. into ENGLISH from various Russian articles
(JPRS-83261) Avail: NTIS HC A06

Topics in meteorology and oceanography are discussed. Aerosols and their role in atmospheric processes, acoustic return-slant atmospheric sounding, sea routes, the uses of the oceans, ocean models, and sea ice are among the topics discussed. For individual titles, see N83-26120 through N83-26122.

N83-26120# Joint Publications Research Service, Arlington, Va.
PAST AND PRESENT OF NORTHERN SEA ROUTE **c48**
K. Chubakov, A. Arikaynen, and M. Shevelev *In its* USSR Rept.: Earth Sci., No. 25 (JPRS-83261) 14 Apr. 1983 p 6-16 Transl. into ENGLISH from Morsk. Flot (Moscow), no. 12, Dec. 1982 p 22-27, 29 (For primary document see N83-26119 15-42)
Avail: NTIS HC A06

A short history of the development of navigation in the Arctic Ocean is followed by a discussion of present and future trends in the exploitation of northern ports. Ice reconnaissance, polar hydrography, and cargo and icebreaker fleets are discussed. R.J.F.

N83-26121# Joint Publications Research Service, Arlington, Va.
SIX DECADES OF OCEAN RESEARCH **c48**
A. S. Monin and K. N. Fedorov *In its* USSR Rept.: Earth Sci., No. 25 (JPRS-83261) 14 Apr. 1983 p 17-25 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow), no. 6, Nov. - Dec. 1982 p 25-31 (For primary document see N83-26119 15-42)
Avail: NTIS HC A06

The progress of Soviet oceanography since the 1920's is discussed. The work of several scientists and research facilities is reviewed. Some research programs are named. R.J.F.

N83-26122# Joint Publications Research Service, Arlington, Va.
FLEET ADMIRAL S. GORSHKOV ON STUDY, USES OF OCEANS **c48**
S. Gorshkov *In its* USSR Rept.: Earth Sci., No. 25 (JPRS-83261) 14 Apr. 1983 p 34-48 refs Transl. into ENGLISH from Morsk. Sb. (Moscow), no. 12, Dec. 1982 p 16-26 (For primary document see N83-26119 15-42)
Avail: NTIS HC A06

The use of oceans is discussed. The military and economic exploitation of oceans is emphasized. The failure of the United States to sign the Law of the Sea Convention is attacked. Areas of research such as hydrochemistry, underwater acoustics, geophysics, ocean thermal energy conversion, ocean models, and underwater resources are discussed. R.J.F.

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N83-26123* National Aeronautics and Space Administration, Washington, D. C.
EARTH RESOURCES: A CONTINUING BIBLIOGRAPHY WITH INDEXES (ISSUE 37)
Apr. 1983 140 p
(NASA-SP-7041(37); NAS 1.21:7041(37)) Avail: NTIS HC A07 CSCL 05B

This bibliography lists 512 reports, articles, and other documents introduced into the NASA scientific and technical information system between January 1 and March 31, 1983. Emphasis is placed on the use of remote sensing and geophysical instrumentation in spacecraft and aircraft to survey and inventory natural resources and urban areas. Subject matter is grouped according to agriculture and forestry, environmental changes and cultural resources, geodesy and cartography, geology and mineral resources, hydrology and water management, data processing and distribution systems, instrumentation and sensors, and economic analysis. Author

N83-26124*# Kansas Univ. Center for Research, Inc., Lawrence. Remote Sensing Lab.
CROP CLASSIFICATION USING AIRBORNE RADAR AND LANDSAT DATA Interim Report
Fawwaz T. Ulaby, Principal Investigator, R. Y. Li, and K. S. Shanmugam Feb. 1981 41 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS
(Contract NAS9-15421; Proj. AgRISTARS)
(E83-10255; NASA-CR-171628; SR-K1-04043; NAS 1.26:171628; RSL-TR-360-13) Avail: NTIS HC A03/MF A01 CSCL 02C

Airborne radar data acquired with a 13.3 GHz scatterometer over a test-site near Colby, Kansas were used to investigate the statistical properties of the scattering coefficient of three types of vegetation cover and of bare soil. A statistical model for radar data was developed that incorporates signal-fading and natural within-field variabilities. Estimates of the within-field and between-field coefficients of variation were obtained for each cover-type and compared with similar quantities derived from LANDSAT images of the same fields. The classification accuracy provided by LANDSAT alone, radar alone, and both sensors combined was investigated. The results indicate that the addition of radar to LANDSAT improves the classification accuracy by about 10; percentage-points when the classification is performed on a pixel basis and by about 15 points when performed on a field-average basis. Author

N83-26125*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
SAMPLING FOR AREA ESTIMATION: A COMPARISON OF FULL-FRAME SAMPLING WITH THE SAMPLE SEGMENT APPROACH
Marilyn M. Hixson, Marvin E. Bauer, and Barbara J. Davis (Indiana Bell Telephone Co., Indianapolis) Jul. 1979 10 p refs Repr. from 1979 Machine Process. of Remotely Sensed Data Symp., 1979 p 97-104 Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development
(Contract NAS9-14970; Proj. AgRISTARS)
(E83-10256; NASA-CR-171627; SR-P1-04160; NAS 1.26:171627; LARS-062779) Avail: NTIS HC A02/MF A01 CSCL 05B

The effect of sampling on the accuracy (precision and bias) of crop area estimates made from classifications of LANDSAT MSS data was investigated. Full-frame classifications of wheat and non-wheat for eighty counties in Kansas were repetitively sampled to simulate alternative sampling plants. Four sampling schemes involving different numbers of samples and different size sampling units were evaluated. The precision of the wheat area estimates increased as the segment size decreased and the number of segments was increased. Although the average bias associated with the various sampling schemes was not significantly different, the maximum absolute bias was directly related to sampling unit size. Author

N83-26126*# Santa Barbara Research Center, Goleta, Calif.
THEMATIC MAPPER FLIGHT MODEL PRESHIPMENT REVIEW DATA PACKAGE. VOLUME 1: SUMMARY REVIEW Final Report
Sep. 1982 85 p ERTS
(Contract NAS5-24200)
(E83-10257; NASA-CR-170526; NAS 1.26:170526; HS-236-0019-1679-Vol-1; HAC-Ref-D4596-Vol-1) Avail: NTIS HC A05/MF A01 CSCL 14B

Tests, test plans, test results are described and results are compared to requirements for the thematic mapper. Summary charts of failure reports and requests for deviation/waiver are included. A.R.H.

N83-26127*# Hughes Aircraft Co., El Segundo, Calif.
THEMATIC MAPPER FLIGHT MODEL PRESHIPMENT REVIEW DATA PACKAGE. VOLUME 2, PART A: SUBSYSTEM DATA Final Report
Sep. 1982 276 p ERTS
(Contract NAS5-24200)
(E83-10258; NASA-CR-170523; NAS 1.26:170523; HS-236-0019-1679-Vol-2-Pt-A; HAC-Ref-D4596-Vol-2-Pt-A) Avail: NTIS HC A13/MF A01 CSCL 14B

Performance and acceptance data are presented for the multiplexer, scan mirror, power supply, mainframe/top mechanical and the aft optics, assemblies. Other major subsystems evaluated include the relay optics, the electronic module, the radiative cooler, and the cable harness. Reference lists of nonconforming materials reports, failure reports, and requests for deviation/waiver are also given. A.R.H.

N83-26128*# Santa Barbara Research Center, Goleta, Calif.
THEMATIC MAPPER FLIGHT MODEL PRESHIPMENT REVIEW DATA PACKAGE. VOLUME 2, PART B: SUBSYSTEM DATA
Sep. 1982 287 p ERTS
(Contract NAS5-24200)
(E83-10259; NASA-CR-170524; NAS 1.26:170524; HS-236-0019-1679-Vol-2-Pt-B; HAC-Ref-D4596-Vol-2-Pt-B) Avail: NTIS HC A13/MF A01 CSCL 14B

Summarized performance data are presented for the following major subsystems of the thematic mapper: the focal plane assembly, the radiative cooler, the radiative cooler door assembly, the top optical assembly, and the telescope assembly. Reference lists of the configurations status and of nonconforming material reports, failure reports, and requests for deviation/waiver are included. A.R.H.

N83-26129*# Santa Barbara Research Center, Goleta, Calif.
THEMATIC MAPPER FLIGHT MODEL PRESHIPMENT REVIEW DATA PACKAGE. VOLUME 2, PART C: SUBSYSTEM DATA Final Report
Sep. 1982 199 p ERTS
(Contract NAS5-24200)
(E83-10260; NASA-CR-170525; NAS 1.26:170525; HS-236-0019-1679-Vol-2-Pt-C; HAC-Ref-D4596-Vol-2-Pt-C) Avail: NTIS HC A09/MF A01 CSCL 14B

Reference lists are provided to acceptance data for each of the major subsystems of the thematic mapper. Configuration reports, lists and copies of all failure reports, and requests for deviation/waiver are included. A.R.H.

N83-26130*# Santa Barbara Research Center, Goleta, Calif.
THEMATIC MAPPER FLIGHT MODEL PRESHIPMENT REVIEW DATA PACKAGE. VOLUME 3, PART A: SYSTEM DATA Final Report
Sep. 1982 272 p ERTS
(Contract NAS5-24200)

(E83-10261; NASA-CR-170527; NAS 1.26:170527; HS-236-0019-1679-Vol-3-Pt-A; HAC-Ref-D4596-Vol-3-Pt-A) Avail: NTIS HC A12/MF A01 CSCL 14B

Results of vibration, acoustical noise, and thermal vacuum are described as well as tests studies of EMI/EMC and mass properties conducted for thematic mapper systems integration. Liens are summarized and the engineering change proposal status is presented. Requests for deviation/waiver are included along with failure and nonforming material reports. A.R.H.

N83-26131*# Santa Barbara Research Center, Goleta, Calif.
THEMATIC MAPPER FLIGHT MODEL PRESHIPMENT REVIEW DATA PACKAGE. VOLUME 3, PART B: SYSTEM DATA Final Report
Sep. 1982 203 p ERTS
(Contract NAS5-24200)
(E83-10262; NASA-CR-170528; NAS 1.26:170528; HS-236-1679-Vol-3-Pt-B; HAC-Ref-D4596-Vol-3-Pt-B) Avail: NTIS HC A10/MF A01 CSCL 14B

Procedures and results are presented for performance and systems integration tests of flight model-1 thematic mapper. Aspects considered cover electronic module integration, radiometric calibration, spectral matching, spatial coverage, radiometric calibration of the calibrator, coherent noise, dynamic square wave response, band to band registration, geometric accuracy, and self induced vibration. Thermal vacuum tests, EMI/EMS, and mass properties are included. Liens are summarized. A.R.H.

N83-26132*# Santa Barbara Research Center, Goleta, Calif.
THEMATIC MAPPER FLIGHT MODEL PRESHIPMENT REVIEW DATA PACKAGE. VOLUME 3, PART C: SYSTEM DATA Final Report
Sep. 1982 213 p ERTS
(Contract NAS5-24200)
(E83-10263; NASA-CR-170529; NAS 1.26:170529; HS-236-0019-1679-Vol-3-Pt-C; HAC-Ref-D4596-Vol-3-Pt-C) Avail: NTIS HC A10/MF A01 CSCL 14B

Failure reports for flight model-1 of the thematic mapper are summarized showing the symptom and cause of failure as well as the corrective action taken. Each report is keyed to the major subsystem against which the failure occurred. Requests for deviation/waiver are listed by number, description, and current status. Copies of engineering proposals are included. A.R.H.

N83-26133*# Santa Barbara Research Center, Goleta, Calif.
THEMATIC MAPPER PROTOFLIGHT MODEL PRESHIPMENT REVIEW DATA PACKAGE. VOLUME 4: APPENDIX. PART A: MULTIPLEXER DATA, BOOK 1 Final Report
Sep. 1982 745 p ERTS
(Contract NAS5-24200)
(E83-10264; NASA-CR-170530; NAS 1.26:170530; HS-236-0019-1679-Vol-4A-Bk-1; HAC-Ref-D4596-Vol-4-Pt-A-Bk-1) Avail: NTIS HC A99/MF A01 CSCL 14B

Data from the final performance tests of the thematic mapper flight model multiplexer at ambient temperature are presented. Results cover the power supply, the input buffer, and the A/D threshold for bands 1 through 4. A.R.H.

N83-26134*# Santa Barbara Research Center, Goleta, Calif.
THEMATIC MAPPER PROTOFLIGHT MODEL PRESHIPMENT REVIEW DATA PACKAGE. VOLUME 4: APPENDIX. PART A: MULTIPLEXER DATA BOOK 2 Final Report
Sep. 1982 713 p ERTS
(Contract NAS5-24200)
(E83-10265; NASA-CR-170531; NAS 1.26:170531; HS-236-0019-1679-Vol-4A-Bk-2; HAC-Ref-D4596-Vol-4-Pt-A-Bk-2) Avail: NTIS HC A99/MF A01 CSCL 14B

Final performance test data for the thematic mapper flight model multiplexer are presented in tables. Aspects covered include A/D thresholds for bands 5, 6, and 7; cross talk; the thermistor; bilevel commands signal parameters; A/D threshold ambient, voltage margin low bus; serial data and bit clock parameters; and the wire check. Tests were conducted at ambient temperature. A.R.H.

N83-26135*# Santa Barbara Research Center, Goleta, Calif.
THEMATIC MAPPER FLIGHT MODEL PRESHIPMENT REVIEW DATA PACKAGE. VOLUME 4: APPENDIX. PART B: SCAN MIRROR ASSEMBLY DATA Final Report
Sep. 1982 533 p ERTS
(Contract NAS5-24200)
(E83-10266; NASA-CR-170532; NAS 1.26:170532; HS-236-0019-1679-Vol-4-Pt-B; HAC-Ref-D4596-Vol-4-Pt-B) Avail: NTIS HC A23/MF A01 CSCL 14B

Data from the thematic mapper scan mirror assembly (SMA) acceptance test are presented. Documentation includes: (1) a list of the acceptance test discrepancies; (2) flight 1 SMA test data book; (3) flight 1 SMA environmental report; (4) the configuration verification index; (5) the flight 1 SMA test failure reports; (6) the flight 1 data tapes log; and (7) the requests for deviation/waivers. A.R.H.

N83-26136*# Santa Barbara Research Center, Goleta, Calif.
THEMATIC MAPPER FLIGHT MODEL PRESHIPMENT REVIEW DATA PACKAGE. VOLUME 4: APPENDIX. PART C: POWER SUPPLY DATA
Sep. 1982 365 p ERTS
(Contract NAS5-24200)
(E83-10267; NASA-CR-170533; NAS 1.26:170533; HS-236-0019-1679-Vol-4-Pt-C; HAC-Ref-D4596-Vol-4-Pt-C) Avail: NTIS HC A16/MF A01 CSCL 14B

The acceptance test data package for the thematic mapper flight model power supply was reviewed and the data compared to the relevant specification. The power supply was found to be within specification. Final test data for outut voltage regulation and ripple, efficiency, over and undervoltage protection, telemetry, impedances, turn-on requirements, and input current limits are presented. M.G

N83-26137*# Santa Barbara Research Center, Goleta, Calif.
THEMATIC MAPPER FLIGHT MODEL PRESHIPMENT REVIEW DATA PACKAGE. VOLUME 4: APPENDIX. PART D: FOCAL PLANE ASSEMBLY DATA
Sep. 1982 440 p ERTS
(Contract NAS5-24200)
(E83-10268; NASA-CR-170534; NAS 1.26:170534; HS-236-0019-1679-Vol-4-Pt-D; HAC-Ref-D4596-Vol-4-Pt-D) Avail: NTIS HC A19/MF A01 CSCL 14B

The data obtained for the Band 1 thematic mapper flight full band assembly (P/N 50797) are summarized. The data were collected from half band, post amplifier, and full band acceptance test data records. M.G.

N83-26138*# Santa Barbara Research Center, Goleta, Calif.
THEMATIC MAPPER FLIGHT MODEL PRESHIPMENT REVIEW DATA PACKAGE. VOLUME 4: APPENDIX. PART E: ELECTRONICS MODULE DATA
Sep. 1982 300 p ERTS
(Contract NAS5-24200)
(E83-10269; NASA-CR-170535; NAS 1.26:170535; HS-236-0019-1679-Vol-4-Pt-E; HAC-Ref-D4596-Vol-4-Pt-E) Avail: NTIS HC A13/MF A01 CSCL 14B

Tests to verify the as-designed performance of all circuits within the thematic mapper electronics module unit are described. Specifically, the tests involved the evaluation of the scan line corrector driver, shutter drivers function, cal lamp controller function, post amplifier function, command decoder verification unit, and the temperature and actuator controllers function. M.G.

N83-26139*# Santa Barbara Research Center, Goleta, Calif.
THEMATIC MAPPER FLIGHT MODEL PRESHIPMENT REVIEW DATA PACKAGE. VOLUME 4: APPENDIX. PART F: RADIATIVE COOLER
Sep. 1982 310 p ERTS
(Contract NAS5-24200)

(E83-10270; NASA-CR-170536; NAS 1.26:170536;
HS-236-0019-1679-Vol-4-Pt-F; HAC-Ref-D4596-Vol-4-Pt-F) Avail: NTIS HC A14/MF A01 CSCL 14B

Performance data for the thematic mapper radiative cooler are presented. Results from workmanship vibration tests and thermal vacuum test are described and an assembly history record is given. M.G.

N83-26140*# Santa Barbara Research Center, Goleta, Calif.
THEMATIC MAPPER FLIGHT MODEL PRESHIPMENT REVIEW DATA PACKAGE. VOLUME 4: APPENDIX. PART G: MISCELLANEOUS SYSTEM DATA
Sep. 1982 296 p ERTS
(E83-10271; NASA-CR-170537; NAS 1.26:170537;
HS-236-0019-1679-Vol-4-Pt-G; HAC-Ref-D4596-Vol-4-Pt-G) Avail: NTIS HC A13/MF A01 CSCL 14B

Functional and design data from various thematic mapper subsystems are presented. Coarse focus, modulation transfer function, and shim requirements are addressed along with spectral matching and spatial coverage tests. M.G.

N83-26141*# General Electric Co., Lanham, Md. Space Systems Div.
LANDSAT-D GROUND SEGMENT OPERATIONS PLAN, REVISION A
B. Evans 16 Jul. 1982 1141 p ERTS
(Contract NAS5-25300)
(E83-10272; NASA-CR-170538; NAS 1.26:170538;
Doc-81SDS4232-Rev-A) Avail: NTIS HC A99/MF A01 CSCL 05B

The basic concept for the utilization of LANDSAT ground processing resources is described. Only the steady state activities that support normal ground processing are addressed. This ground segment operations plan covers all processing of the multispectral scanner and the processing of thematic mapper through data acquisition and payload correction data generation for the LANDSAT 4 mission. The capabilities embedded in the hardware and software elements are presented from an operations viewpoint. The personnel assignments associated with each functional process and the mechanisms available for controlling the overall data flow are identified. A.R.H.

N83-26142*# General Electric Co., Philadelphia, Pa. Space Systems Div.
LANDSAT-D DATA FORMAT CONTROL BOOK. VOLUME 2: TELEMETRY
R. Talipsky Oct. 1982 378 p refs ERTS
(Contract NAS5-25300)
(E83-10275; NASA-CR-170540; NAS 1.26:170540;
SVS-10123A-Vol-2) Avail: NTIS HC A17/MF A01 CSCL 09F

The formats used for the transmission of LANDSAT-D and LANDSAT-D Prime spacecraft telemetry data through either the TDRS/GSTDN via the NASCOM Network to the CSF are described as well as the telemetry flow from the command and data handling subsystem, a telemetry list and telemetry matrix assignment for the mission and engineering formats. The on-board computer (OBC) controlled format and the dwell format are also discussed. The OBCs contribution to telemetry, and the format of the reports, are covered. The high rate data channel includes the payload correction data format, the narrowband tape recorder and the OBC dump formats. A.R.H.

N83-26143*# General Electric Co., Philadelphia, Pa. Space Div.
LANDSAT-D DATA FORMAT CONTROL BOOK. VOLUME 5: (PAYLOAD)
H. Andrew 23 Nov. 1981 71 p refs ERTS
(Contract NAS5-25300)
(E83-10276; NASA-CR-170542; NAS 1.26:170542;
SVS-10126-Vol-5-Rev-A) Avail: NTIS HC A04/MF A01 CSCL 05B

The LANDSAT-D flight segment payload is the thematic mapper and the multispectral scanner. Narrative and visual descriptions of the LANDSAT-D payload data handling hardware and data flow paths from the sensing instruments through to the GSFC LANDSAT-D data management system are provided. Key subsystems are examined. A.R.H.

N83-26144*# General Electric Co., Lanham, Md. Space Systems Div.
LANDSAT-D DATA FORMAT CONTROL BOOK. VOLUME 6: (PRODUCTS)
F. Kabat 31 Jul. 1981 49 p ERTS
(Contract NAS5-25300)
(E83-10277; NASA-CR-170541; NAS 1.26:170541;
SVS-10127-Vol-6) Avail: NTIS HC A03/MF A01 CSCL 05B

Four basic product types are generated from the raw thematic mapper (TM) and multispectral scanner (MSS) payload data by the NASA GSFC LANDSAT 4 data management system: (1) unprocessed data (raw sensor data); (2) partially processed data, which consists of radiometrically corrected sensor data with geometric correction information appended; (3) fully processed data, which consists of radiometrically and geometrically corrected sensor data; and (4) inventory data which consists of summary information about product types 2 and 3. High density digital recorder formatting and the radiometric correction process are described. Geometric correction information is included. A.R.H.

N83-26145*# General Electric Co., Lanham, Md. Space Systems Div.
LANDSAT-D DATA FORMAT CONTROL BOOK. VOLUME 6, APPENDIX K: UNPROCESSED MULTISPECTRAL SCANNER HIGH DENSITY TAPE (HDT-RM/HDT-GM)
K. Andersen 29 Sep. 1981 15 p ERTS
(Contract NAS5-25300)
(E83-10278; NASA-CR-170543; NAS 1.26:170543;
GES-10075-Vol-6-App-K-Rev-B) Avail: NTIS HC A02/MF A01 CSCL 05B

Unprocessed MSS data which is recorded on HDT-RM (a 28 track, high density tape) and on HDT-GM (a 14 track, nonbias recorded, high density tape) are inputs for the LANDSAT 4 data management system. All MSS data initially recorded on HDT-GM are copied to HDT-RM prior to processing. This specification establishes the requirements for the format of the LANDSAT D HDT-RM/HDT-GM. A.R.H.

N83-26146*# General Electric Co., Philadelphia, Pa. Space Div.
LANDSAT-D DATA FORMAT CONTROL BOOK. VOLUME 6, APPENDIX G: GSFC HDT-AM INVENTORY TAPE (GHIT-AM)
21 Sep. 1981 90 p ERTS
(Contract NAS5-25300)
(E83-10279; NASA-CR-170539; NAS 1.26:170539;
GES-10068-Vol-6-App-G-Rev-A) Avail: NTIS HC A05/MF A01 CSCL 05B

The data format specifications of the Goddard HDT inventory tapes (GHITS), which accompany shipments of archival digital multispectral scanner image data (HDT-AM tapes), are defined. The GHIT is a nine-track, 1600-BPI tape which conforms to the ANSI standard and serves as an inventory and description of the image data included in the shipment. The archival MSS tapes (HDT-AMs) contain radiometrically corrected but geometrically uncorrected image data plus certain ancillary data necessary to perform the geometric corrections. M.G.

N83-26147*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LANDSAT-D WORLDWIDE REFERENCE SYSTEM (WRS) USERS GUIDE
30 Jun. 1981 238 p ERTS
(E83-10280; NASA-TM-85311; NAS 1.15:85311) Avail: NTIS HC A11/MF A01 CSCL 05B

A functional description of the LANDSAT-D Worldwide Reference System (WRS) and an overview of the main orbital parameters and instrument coverages are presented. The primary information required to understand the LANDSAT-D orbital characteristics, to

effectively use the Worldwide Reference System (WRS) indexing scheme, and to request specific geographic coverage on the desired observation dates is provided. M.G.

N83-26148*# General Electric Co., Philadelphia, Pa. Space Systems Div.
LANDSAT-D MSS/TM TUNED ORBITAL JITTER ANALYSIS MODEL LDS900 Final Report
T. E. Pollak Aug. 1981 150 p refs ERTS
(Contract NAS5-25300)
(E83-10281; NASA-CR-170546; NAS 1.26:170546; Doc-81SDS4226) Avail: NTIS HC A07/MF A01 CSCL 05B

The final LANDSAT-D orbital dynamic math model (LSD900), comprised of all test validated substructures, was used to evaluate the jitter response of the MSS/TM experiments. A dynamic forced response analysis was performed at both the MSS and TM locations on all structural modes considered (thru 200 Hz). The analysis determined the roll angular response of the MSS/TM experiments to improve excitation generated by component operation. Cross axis and cross experiment responses were also calculated. The excitations were analytically represented by seven and nine term Fourier series approximations, for the MSS and TM experiment respectively, which enabled linear harmonic solution techniques to be applied to response calculations. Single worst case jitter was estimated by variations of the eigenvalue spectrum of model LSD 900. The probability of any worst case mode occurrence was investigated. A.R.H.

N83-26149*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LANDSAT-D MISSION SYSTEM INDUSTRY BRIEFING
1982 119 p Briefing held at Goddard Space Flight Center, 26 Feb. 1982 ERTS
(E83-10282; NASA-TM-85309; NAS 1.15:85309) Avail: NTIS HC A06/MF A01 CSCL 05B

Viewgraphs and photographs depict the scope and purpose of the LANDSAT 4 mission as well as all satellite systems. The components and major functions of the flight and ground segments, operational support, communication links, and the hardware and interfaces for processing MSS and TM images are covered.A.R.H.

N83-26150*# Hughes Aircraft Co., El Segundo, Calif. Space and Communications Group.
MULTISPECTRAL SCANNER FLIGHT MODEL (F-1) RADIOMETRIC CALIBRATION AND ALIGNMENT HANDBOOK
Dec. 1981 209 p ERTS
(Contract NAS5-25050)
(E83-10283; NASA-CR-170551; NAS 1.26:170551; HS-248-1490; HAC-Ref-E1966) Avail: NTIS HC A10/MF A01 CSCL 14B

This handbook on the calibration of the MSS-D flight model (F-1) provides both the relevant data and a summary description of how the data were obtained for the system radiometric calibration, system relative spectral response, and the filter response characteristics for all 24 channels of the four band MSS-D F-1 scanner. The calibration test procedure and resulting test data required to establish the reference light levels of the MSS-D internal calibration system are discussed. The final set of data ('nominal' calibration wedges for all 24 channels) for the internal calibration system is given. The system relative spectral response measurements for all 24 channels of MSS-D F-1 are included. These data are the spectral response of the complete scanner, which are the composite of the spectral responses of the scan mirror primary and secondary telescope mirrors, fiber optics, optical filters, and detectors. Unit level test data on the measurements of the individual channel optical transmission filters are provided. Measured performance is compared to specification values. A.R.H.

N83-26151*# New Mexico State Univ., Las Cruces. Lab. of Physical Science.
FULL SCALE LANDSAT-D ANTENNA PATTERN MEASUREMENTS Final Report
Dec. 1979 369 p Prepared for GE, Philadelphia ERTS
(Contract NAS5-15300)
(E83-10284; NASA-CR-170552; NAS 1.26:170552; PF-00955) Avail: NTIS HC A16/MF A01 CSCL 20N

The design verification of the LANDSAT-D antenna subsystem is addressed. In particular, the analysis of the antenna radiation patterns utilizing a full scale mockup of the LANDSAT-D satellite is discussed. Test antennas included two S-Band shaped beam antennas, two S-Band omni unit radiators (to operate in array), a GPS antenna, an X-Band shaped beam antenna, and one S-Band high-gain parabolic antenna. M.G.

N83-26152*# Department of Agriculture, Washington, D.C. Statistical Research Div.
USER'S APPRAISAL OF YIELD MODEL EVALUATION CRITERIA
Fred B. Warren, Principal Investigator Apr. 1982 10 p Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS
(Proj. AgRISTARS)
(E83-10323; NASA-CR-170387; YM-U2-00740; NAS 1.26:170387) Avail: NTIS HC A02/MF A01 CSCL 02C

The five major potential USDA users of AgRISTAR crop yield forecast models rated the Yield Model Development (YMD) project Test and Evaluation Criteria by the importance placed on them. These users were agreed that the 'TIMELINES' and 'RELIABILITY' of the forecast yields would be of major importance in determining if a proposed yield model was worthy of adoption. Although there was considerable difference of opinion as to the relative importance of the other criteria, 'COST', 'OBJECTIVITY', 'ADEQUACY', AND 'MEASURES OF ACCURACY' generally were felt to be more important that 'SIMPLICITY' and 'CONSISTENCY WITH SCIENTIFIC KNOWLEDGE'. However, some of the comments which accompanied the ratings did indicate that several of the definitions and descriptions of the criteria were confusing. Author

N83-26153*# Earth Satellite Corp., Chevy Chase, Md.
IMPLICATIONS OF INFORMATION FROM LANDSAT-4 FOR PRIVATE INDUSTRY
John R. Everett and Jon D. Dykstra, Principal Investigators [1983] 7 p Sponsored by NASA ERTS
(E83-10330; NASA-CR-170385; NAS 1.26:170385) Avail: NTIS HC A02/MF A01 CSCL 05B

The broader spectral coverage and higher resolution of LANDSAT-4 Thematic Mapper (TM) data open the door for identification from space of spectral phenomena associated with mineralization and microseepage of hydrocarbon. Digitally enhanced image products generated from TM data allow the mapping of many major and minor structural features that mark or influence emplacement of mineralization and accumulation of hydrocarbons. These improvements in capabilities over multispectral scanner data should accelerate the acceptance and integration of satellite data as a routinely used exploration tool that allows rapid examination of large areas in considerable detail. Imagery of Southern Ontario, Canada as well as of Cement, Oklahoma and Death Valley, California is discussed. A.R.H.

N83-26154*# California Univ., Berkeley. Space Sciences Lab.
ANALYSIS OF THE QUALITY OF IMAGE DATA ACQUIRED BY THE LANDSAT-4 THEMATIC MAPPER AND MULTISPECTRAL SCANNERS Quarterly Status Technical Progress Report, 3 Jan. - 31 Mar. 1983
Robert N. Colwell, Principal Investigator 10 May 1983 12 p refs ERTS
(Contract NAS5-27377)
(E83-10331; NASA-CR-170386; NAS 1.26:170386; QSTPR-1) Avail: NTIS HC A02/MF A01 CSCL 05B

Image products and numeric data were extracted from both TM and MSS data in an effort to evaluate the quality of these data for interpreting major agricultural resources and conditions in California's Central Valley. The utility of TM data appears excellent for meeting most of the inventory objectives of the agricultural resource specialist. These data should be extremely valuable for crop type and area proportion estimation, for updating agricultural

land use survey maps at 1:24,000-scale and smaller, for field boundary definition, and for determining the size and location of individual farmsteads. A.R.H.

N83-26155*# Marshall Univ., Huntington, W. Va.
PROCEEDINGS OF THE NATIONAL CONFERENCE ON ENERGY RESOURCE MANAGEMENT. VOLUME 1: TECHNIQUES, PROCEDURES AND DATA BASES
James O. Brumfield, ed. and Yale M. Schiffman, ed. 1982 306 p refs Conf. held in Baltimore, 9-12 Sep. 1982; sponsored by NASA, American Planning Association, Nuclear Regulatory Commission and US Region of the Remote Sensing Society Sponsored by NASA Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS 2 Vol.
(E83-10335; NASA-CP-2261-Vol-1; NAS 1.55:2261-Vol-1) Avail: NTIS HC A14/MF A01 CSCL 05B

Topics dealing with the integration of remotely sensed data with geographic information system for application in energy resources management are discussed. Associated remote sensing and image analysis techniques are also addressed. For individual titles, see N83-26156 through N83-26175.

N83-26156*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A STUDY OF FEATURE EXTRACTION USING DIVERGENCE ANALYSIS OF TEXTURE FEATURES
W. A. Hallada, B. Bly, R. K. Boyd, and S. Cox *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 1 1982 p 3-18 refs Prepared in cooperation with Computer Sciences Corp., Silver Spring, Md. Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS (For primary document see N83-26155 15-43)
Avail: NTIS HC A14/MF A01 CSCL 05B

An empirical study of texture analysis for feature extraction and classification of high spatial resolution remotely sensed imagery (10 meters) is presented in terms of specific land cover types. The principal method examined is the use of spatial gray tone dependence (SGTD). The SGTD method reduces the gray levels within a moving window into a two-dimensional spatial gray tone dependence matrix which can be interpreted as a probability matrix of gray tone pairs. Haralick et al (1973) used a number of information theory measures to extract texture features from these matrices, including angular second moment (inertia), correlation, entropy, homogeneity, and energy. The derivation of the SGTD matrix is a function of: (1) the number of gray tones in an image; (2) the angle along which the frequency of SGTD is calculated; (3) the size of the moving window; and (4) the distance between gray tone pairs. The first three parameters were varied and tested on a 10 meter resolution panchromatic image of Maryville, Tennessee using the five SGTD measures. A transformed divergence measure was used to determine the statistical separability between four land cover categories forest, new residential, old residential, and industrial for each variation in texture parameters. M.G.

N83-26157*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PRINCIPAL COMPONENTS AS A DATA REDUCTION AND NOISE REDUCTION TECHNIQUE
Marc L. Imhoff and William J. Campbell *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 1 1982 p 19-31 refs ERTS (For primary document see N83-26155 15-43)
Avail: NTIS HC A14/MF A01 CSCL 05B

The potential of principal components as a pipeline data reduction technique for thematic mapper data was assessed and principal components analysis and its transformation as a noise reduction technique was examined. Two primary factors were considered: (1) how might data reduction and noise reduction using the principal components transformation affect the extraction of accurate spectral classifications; and (2) what are the real savings in terms of computer processing and storage costs of using reduced data over the full 7-band TM complement. An area in central Pennsylvania was chosen for a study area. The image data for the project were collected using the Earth Resources Laboratory's thematic mapper simulator (TMS) instrument. M.G.

N83-26158*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OPTIMIZATION OF A NON-TRADITIONAL UNSUPERVISED CLASSIFICATION APPROACH FOR LAND COVER ANALYSIS
R. K. Boyd (Computer Sciences Corp., Greenbelt, Md.), J. O. Brumfield (Marshall Univ.), and W. J. Campbell *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 1 1982 p 32-44 refs ERTS (For primary document see N83-26155 15-43)
Avail: NTIS HC A14/MF A01 CSCL 05B

The conditions under which a hybrid of clustering and canonical analysis for image classification produce optimum results were analyzed. The approach involves generation of classes by clustering for input to canonical analysis. The importance of the number of clusters input and the effect of other parameters of the clustering algorithm (ISOCLS) were examined. The approach derives its final result by clustering the canonically transformed data. Therefore the importance of number of clusters requested in this final stage was also examined. The effect of these variables were studied in terms of the average separability (as measured by transformed divergence) of the final clusters, the transformation matrices resulting from different numbers of input classes, and the accuracy of the final classifications. The research was performed with LANDSAT MSS data over the Hazleton/Berwick Pennsylvania area. Final classifications were compared pixel by pixel with an existing geographic information system to provide an indication of their accuracy. M.G.

N83-26159*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
USING HCMM THERMAL DATA TO IMPROVE CLASSIFICATION OF MSS DATA
R. G. Witt and R. S. Sekhon (Computer Sciences Corp., Greenbelt, Md.) *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 1 1982 p 45-55 refs HCMM (For primary document see N83-26155 15-43)
Avail: NTIS HC A14/MF A01 CSCL 05B

Spectral overlap between urban and rural land use/land cover categories can lead to unacceptable map accuracy levels in the classification of LANDSAT multispectral scanner (MSS) data. The four MSS bands used alone are not always adequate to distinguish among various land uses and cover types having similar spectral responses. The use of thermal data from the Heat Capacity Mapping Mission (HCMM) satellite as a means of improving MSS land cover classification accuracies for urban versus rural categories was investigated. The approaches used to integrate the HCMM data are described. M.G.

N83-26160*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE USE OF PRINCIPAL COMPONENTS FOR CREATING IMPROVED IMAGERY FOR GEOMETRIC CONTROL POINT SELECTION
Marc L. Imhoff *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 1 1982 p 56-68 refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS (For primary document see N83-26155 15-43)
Avail: NTIS HC A14/MF A01 CSCL 05B

A directed principal component (PC) analysis and its transformation was applied to 7-channel thematic mapper simulator (TMS) data and 4-channel LANDSAT multispectral scanner system (MSS) data collected over the city of Lancaster, Pennsylvania, to create improved imagery for geometric control point selection for image to image registration. Nineteen temporally stable geometric control points, such as road interactions and bridges, were selected for a 236 sq km area. The control points were visible on both the TMS and MSS imagery. On the first attempt the corresponding image

control points were selected on both data sets without using the principal components transformation. Many of the road intersection locations were visible but the actual road crossings could not be distinguished. As a result, mensuration errors using raw data exceeded the equivalent of two (79 x 79 m) pixels. The application of a guided principal components transformation yielded TMS and MSS single band images showing improved detail in the scene's urban and residential infrastructure. The PC transformed data sets were then utilized for the reselection of geometric control points. By shown greater detail, control points on both the TMS and MSS imagery could be located with greater precision using the PC transformed data. M.G.

N83-26161*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

GROUND TRUTH SAMPLING AND LANDSAT ACCURACY ASSESSMENT

Jon W. Robinson (Computer Sciences Corp., Greenbelt, Md.), Fred J. Gunther (Computer Sciences Corp., Greenbelt, Md.), and William J. Campbell *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 1 1982 p 69-82 refs ERTS (For primary document see N83-26155 15-43)

Avail: NTIS HC A14/MF A01 CSCL 05B

It is noted that the key factor in any accuracy assessment of remote sensing data is the method used for determining the ground truth, independent of the remote sensing data itself. The sampling and accuracy procedures developed for nuclear power plant siting study are described. The purpose of the sampling procedure was to provide data for developing supervised classifications for two study sites and for assessing the accuracy of that and the other procedures used. The purpose of the accuracy assessment was to allow the comparison of the cost and accuracy of various classification procedures as applied to various data types. M.G.

N83-26162*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

LANDSAT DIGITAL DATA BASE PREPARATION FOR THE PENNSYLVANIA DEFOLIATION APPLICATION PILOT TEST

R. G. McLeod and A. Zobrist *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 1 1982 p 83-96 refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS (For primary document see N83-26155 15-43)

Avail: NTIS HC A14/MF A01

A LANDSAT digital mosaic data base for the State of Pennsylvania was prepared for use in the development of an automated system to annually estimate the extent and severity of Gypsy Moth defoliation of hardward forests. The techniques for detecting the defoliation and development of a geographic information system (GIS) to assess damage is being developed jointly by NASA/ Goddard Space Flight Center and Pennsylvania State University using the JPL prepared mosaic base. The JPL processing involved the use of ground control points from the Master Data Processor for planimetric control, resampling of the LANDSAT data to 57 x 57 meter pixels, realignment to north, and reprojection to the Universal Transverse Mercator (UTM) projection in UTM zones 17 and 18. The completed mosaic for each UTM zone was subdivided into 1 degree of latitude by 2 degrees of longitude quadrangles for easy data handling. Consideration is given to the issues of mapping standards, sensor and spacecraft platform characteristics, and their implication to geographic information systems operation. Methods for obtaining measures of accuracy for LANDSAT mosaics are reviewed. M.G.

N83-26163*# Edgerton, Germeshausen and Grier, Inc., Santa Barbara, Calif.

IMAGE ANALYSIS FOR FACILITY SITING: A COMPARISON OF LOW AND HIGH-ALTITUDE IMAGE INTERPRETABILITY FOR LAND USE/LAND COVER MAPPING

H. M. Borella, J. E. Estes, C. E. Ezra, J. Scepan, and L. R. Tinney *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 1 1982 p 97-121 refs Prepared in cooperation with California Univ., Santa Barbara ERTS (For primary document see N83-26155 15-43)

Avail: NTIS HC A14/MF A01 CSCL 05B

For two test sites in Pennsylvania the interpretability of commercially acquired low-altitude and existing high-altitude aerial photography are documented in terms of time, costs, and accuracy for Anderson Level II land use/land cover mapping. Information extracted from the imagery is to be used in the evaluation process for siting energy facilities. Land use/land cover maps were drawn at 1:24,000 scale using commercially flown color infrared photography obtained from the United States Geological Surveys' EROS Data Center. Detailed accuracy assessment of the maps generated by manual image analysis was accomplished employing a stratified unaligned adequate class representation. Both 'area-weighted' and 'by-class' accuracies were documented and field-verified. A discrepancy map was also drawn to illustrate differences in classifications between the two map scales. Results show that the 1:24,000 scale map set was more accurate (99% to 94% area-weighted) than the 1:62,500 scale set, especially when sampled by class (96% to 66%). The 1:24,000 scale maps were also more time-consuming and costly to produce, due mainly to higher image acquisition costs. M.G.

N83-26164*# George Washington Univ., Washington, D.C. Dept. of Geology.

POTENTIAL OF A NEW TECHNIQUE FOR REMOTE SENSING OF HYDROCARBON ACCUMULATIONS AND BLIND URANIUM DEPOSITS: BURIED LIF THERMOLUMINESCENCE DOSIMETERS

F. R. Siegel, J. E. Vaz (Inst. Venezolano de Investigaciones Cientificas, Caracas), and R. C. Lindholm (George Washington Univ., Washington, D.C.) *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 1 1982 p 122-132 refs ERTS (For primary document see N83-26155 15-43)

Avail: NTIS HC A14/MF A01 CSCL 08G

Buried thermoluminescence dosimeters may be useful in remote sensing of petroleum and natural gas accumulations and blind uranium deposits. They act as integrating detectors that smooth out the effects of environmental variations that affect other measuring systems and result in irregularities and poor repeatability in measurements made during gas and radiometric surveys. Author

N83-26165*# Autometric Corp., Inc., Falls Church, Va.

GIS INTEGRATION FOR QUANTITATIVELY DETERMINING THE CAPABILITIES OF FIVE REMOTE SENSORS FOR RESOURCE EXPLORATION

R. Pascucci and A. Smith *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 1 1982 p 135-148 refs ERTS (For primary document see N83-26155 15-43)

Avail: NTIS HC A14/MF A01 CSCL 08G

To assist the U.S. Geological Survey in carrying out a Congressional mandate to investigate the use of side-looking airborne radar (SLAR) for resources exploration, a research program was conducted to define the contribution of SLAR imagery to structural geologic mapping and to compare this with contributions from other remote sensing systems. Imagery from two SLAR systems and from three other remote sensing systems was interpreted, and the resulting information was digitized, quantified and intercompared using a computer-assisted geographic information system (GIS). The study area covers approximately 10, 000 square miles within the Naval Petroleum Reserve, Alaska, and is situated between the foothills of the Brooks Range and the North Slope. The principal objectives were: (1) to establish quantitatively, the total information contribution of each of the five remote sensing systems to the mapping of structural geology; (2) to determine the amount of information detected in common when the sensors are used in combination; and (3) to determine the amount of unique, incremental information detected by each sensor when used in combination with others. The remote sensor imagery that was investigated included real-aperture and synthetic-aperture radar imagery, standard and digitally enhanced LANDSAT MSS imagery, and aerial photos. M.G.

N83-26166*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE ORSER LANDSAT DATA BASE OF PENNSYLVANIA
B. J. Turner (Pennsylvania State Univ., University Park) and D. L. Williams *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 1 1982 p 149-160 refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS (For primary document see N83-26155 15-43)
Avail: NTIS HC A14/MF A01 CSCL 05B

A mosaicked LANDSAT data base for Pennsylvania, installed at the computation center of the Pennsylvania State University is described. Initially constructed by Penn State's Office for Remote Sensing of Earth Resources (ORSER) for the purpose of assisting in state-wide mapping of gypsy moth defoliation, the data base will be available to a variety of potential users. It will provide geometrically correct LANDSAT data accessible by political, jurisdictional, or arbitrary boundaries. Author

N83-26167*# Maryland Univ., College Park. Remote Sensing Systems Lab.
MERGING LANDSAT DERIVED LAND COVERS INTO QUAD-REFERENCED GEOGRAPHIC INFORMATION SYSTEMS
James M. White, Robert M. Ragan, and K. Peter Lade (Salisbury State Coll., Md.) *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 1 1982 p 161-181 Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS (For primary document see N83-26155 15-43)
Avail: NTIS HC A14/MF A01 CSCL 05B

An approach for merging multiscene LANDSAT data bases into existing geographic information systems having 5-second or smaller cells is described. The approach uses the output from the State of Maryland's UNIVAC 1180-based LANDSAT classification program ASTEP (Algorithm Simulation Test and Evaluation) developed by NASA. The structure of the technique was designed to address the problems that emerged as part of the LANDSAT classification of the 64,000 square mile Chesapeake water shed involving twelve scenes. The removal of overlap among adjacent scenes, the crossreferencing of ground control points, and the isolation of the appropriate pixels from the LANDSAT data base for subsequent positioning into a file containing ancillary data referenced to a specific USGS 7 1/2 minute quadrangle sheet are described. Examples illustrate the clustering of classified LANDSAT pixels to define the dominant land use for each of 8,100 cells within a series of quadrangle sheets distributed over the State of Maryland. The approach uses a hard copy terminal tied to an ASTEP algorithm through telephone lines. A coordinate digitizing board for inputing the position of ground control points is also valuable, although manual measurements are possible. The approach is quite efficient and should be especially attractive for use on regional scale studies. M.G.

N83-26168*# Maryland Univ., College Park. Dept. of Civil Engineering.
REMOTE SENSING/GIS INTEGRATION FOR SITE PLANNING AND RESOURCE MANAGEMENT
J. D. Fellows *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 1 1982 p 182-202 refs ERTS (For primary document see N83-26155 15-43)
Avail: NTIS HC A14/MF A01 CSCL 05B

The development of an interactive/batch gridded information system (array of cells georeferenced to USGS quad sheets) and interfacing application programs (e.g., hydrologic models) is discussed. This system allows non-programer users to request any data set(s) stored in the data base by inputing any random polygon's (watershed, political zone) boundary points. The data base information contained within this polygon can be used to produce maps, statistics, and define model parameters for the area. Present/proposed conditions for the area may be compared by inputing future usage (land cover, soils, slope, etc.). This system, known as the Hydrologic Analysis Program (HAP), is especially effective in the real time analysis of proposed land cover changes on runoff hydrographs and graphics/statistics resource inventories of random study area/watersheds. M.G.

N83-26169*# Pennsylvania State Univ., University Park.
AN INTERFACE FOR REMOTE SENSING DIGITAL IMAGE SYSTEMS AND GEOGRAPHIC INFORMATION SYSTEMS
R. R. Irish and W. L. Myers *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 1 1982 p 203-211 refs ERTS (For primary document see N83-26155 15-43)
Avail: NTIS HC A14/MF A01 CSCL 05B

An interfacing technique, zonation algorithms (ZONAL), which provides a means of utilizing LANDSAT information in a polygon-based geographic information system (GIS) is discussed. The ZONAL mechanisms are based on the use of existing GIS polynomial layer, thereby making the process entirely automated. M.G.

N83-26170*# Adirondack Park Agency, Ray Brook, N.Y.
DEVELOPMENT OF LANDSAT DERIVED FOREST COVER INFORMATION FOR INTEGRATION INTO ADIRONDACK PARK GIS
R. Curran and J. Banta *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 1 1982 p 212-230 refs ERTS (For primary document see N83-26155 15-43)
Avail: NTIS HC A14/MF A01 CSCL 05B

Based upon observed changes in timber harvest practices partially attributable to forest biomass removable for energy supply purposes, the Adirondack Park Agency began in 1979 a multi-year project to implement a digital geographic information system (GIS). An initial developmental task was an inventory of forest cover information and analysis of forest resource change and availability. While developing the GIS, a pilot project was undertaken to evaluate the usefulness of LANDSAT derived land cover information for this purpose, and to explore the integration of LANDSAT data into the GIS. The prototype LANDSAT analysis project involved: (1) the use of both recent and historic data to derive land cover information for two dates; and (2) comparison of land cover over time to determine quantitative and geographic changes. The 'recent data,' 1978 full foliage data over portions of four LANDSAT scenes, was classified, using ground truth derived training samples in various forested and non-forested categories. Forested categories include the following: northern hardwoods, pine, spruce-fir, and pine plantation, while nonforested categories include wet-conifer, pasture, grassland, urban, exposed soil, agriculture, and water. M.G.

N83-26171*# Resource Planning Associates, Inc., Ithaca, N.Y.
INTERACTIVE MANAGEMENT AND UPDATING OF SPATIAL DATA BASES
P. French and M. Taylor *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 1 1982 p 231-238 refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS (For primary document see N83-26155 15-43)
Avail: NTIS HC A14/MF A01 CSCL 05B

The decision making process, whether for power plant siting, load forecasting or energy resource planning, invariably involves a blend of analytical methods and judgement. Management decisions can be improved by the implementation of techniques which permit an increased comprehension of results from analytical models. Even where analytical procedures are not required, decisions can be aided by improving the methods used to examine spatially and temporally variant data. How the use of computer aided planning (CAP) programs and the selection of a predominant data structure, can improve the decision making process is discussed. M.G.

N83-26172*# Oklahoma State Univ., Stillwater. Center for Applications of Remote Sensing.
THE OKLAHOMA GEOGRAPHIC INFORMATION RETRIEVAL SYSTEM
W. Anthony Blanchard *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 1 1982 p 239-249 refs ERTS (For primary document see N83-26155 15-43)

Avail: NTIS HC A14/MF A01 CSCL 05B

The Oklahoma Geographic Information Retrieval System (OGIRS) is a highly interactive data entry, storage, manipulation, and display software system for use with geographically referenced data. Although originally developed for a project concened with coal strip mine reclamation, OGIRS is capable of handling any geographically referenced data for a variety of natural resource management applications. A special effort has been made to integrate remotely sensed data into the information system. The timeliness and synoptic coverage of satellite data are particularly useful attributes for inclusion into the geographic information system. Author

N83-26173*# Greenhorn and O'Mara, Inc., Riverdale, Md.
DATA BASE MANAGEMENT FOR GEOGRAPHIC INFORMATION SYSTEMS
Michael G. Pavlides *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 1 1982 p 250-255 refs ERTS (For primary document see N83-26155 15-43)
Avail: NTIS HC A14/MF A01 CSCL 05B

A logical approach to determine the data base 'order of entry' is presented which utilizes management techniques and 'consideration factors'. M.G.

N83-26174*# Yale Univ., New Haven, Conn. School of Forestry and Environmental Studies.
SPATIALLY CHARACTERIZING EFFECTIVE TIMBER SUPPLY
J. K. Berry and J. Sailor (Intergraph Corp.) *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 1 1982 p 256-266 refs ERTS (For primary document see N83-26155 15-43)
Avail: NTIS HC A14/MF A01 CSCL 02F

The structure of a computer-oriented cartographic model for assessing roundwood supply for generation of base load electricity is discussed. The model provides an analytical procedure for coupling spatial information of harvesting economics and owner willingness to sell stumpages. Supply is characterized in terms of standing timber; of accessibility considering various harvesting and hauling factors; and of availability as affected by ownership and residential patterns. Factors governing accessibility to timber include effective harvesting distance to haulic roads as modified by barriers and slopes. Haul distance is expressed in units that take into account the relative ease of travel along various road types to a central processing facility. Areas of accessible timber are grouped into spatial units, termed 'timbersheds', of common access to particular haul road segments that belong to unique 'transport zones'. Timber availability considerations include size of ownership parcels, housing density and excluded areas. The analysis techniques are demonstrated for a cartographic data base in western Massachusetts. M.G.

N83-26175*# Yale Univ., New Haven, Conn. School of Forestry and Environmental Studies.
CARTOGRAPHIC MODELING: COMPUTER-ASSISTED ANALYSIS OF SPATIALLY DEFINED NEIGHBORHOODS
J. K. Berry and C. D. Tomlin (Harvard Univ., Cambridge, Mass.) *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 1 1982 p 267-278 refs ERTS (For primary document see N83-26155 15-43)
Avail: NTIS HC A14/MF A01 CSCL 08B

Cartographic models addressing a wide variety of applications are composed of fundamental map processing operations. These primitive operations are neither data base nor application-specific. By organizing the set of operations into a mathematical-like structure, the basis for a generalized cartographic modeling framework can be developed. Among the major classes of primitive operations are those associated with reclassifying map categories, overlaying maps, determining distance and connectivity, and characterizing cartographic neighborhoods. The conceptual framework of cartographic modeling is established and techniques for characterizing neighborhoods are used as a means of demonstrating some of the more sophisticated procedures of computer-assisted map analysis. A cartographic model for assessing effective roundwood supply is briefly described as an example of a computer analysis. Most of the techniques described have been implemented as part of the map analysis package developed at the Yale School of Forestry and Environmental Studies. M.G.

N83-26176*# Marshall Univ., Huntington, W. Va.
PROCEEDINGS OF THE NATIONAL CONFERENCE ON ENERGY RESOURCE MANAGEMENT. VOLUME 2: APPLICATIONS
James O. Brumfield, ed. and Yale M. Schiffman, ed. 1982 415 p refs Conf. held in Baltimore, 9-12 Sep. 1982; sponsored by NASA, American Planning Association, Nuclear Regulatory Commission and US Region of the Remote Sensing Society Sponsored by NASA Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS 2 Vol.
(E83-10336; NASA-CP-2261-Vol-2; NAS 1.55:2261-Vol-2) Avail: NTIS HC A18/MF A01

Subject areas related to the integration of remotely sensed data with geographic information systems for application in energy resource management are covered. The current trends and advances in the application of these systems to a number of energy concerns are addressed. For individual titles, see N83-26177 through N83-26200.

N83-26177*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
COMPARISON OF LAND COVER INFORMATION FROM LANDSAT MSS AND AIRBORNE TMS FOR HYDROLOGICAL APPLICATIONS: PRELIMINARY RESULTS
J. C. Gervin, Y. C. Lu, W. A. Hallada, and R. F. Marcell *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 289-302 refs Prepared in cooperation with Computer Sciences Corp., Greenbelt, Md. ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 08H

Land cover information for the Clinton River Basin (Michigan) derived from LANDSAT multispectral scanner (MSS) data was compared with that from airborne thematic mapper simulator (TMS) to investigate the probable capabilities of the thematic mapper (TM) launched aboard LANDSAT-4 in July 1982. The preliminary findings for one 7.5 minute topographic map, Mt. Clemens West, are reported. Significant improvements in land cover classification accuracy were obtained using TMS data as compared with MSS data. Overall mapping accuracy increased from 49 to 61 percent with an improvement from 71 to 84 percent in the residential category. A combination of four bands with one band in each major region of the spectrum (visible, near IR, middle IR and thermal IR) provided as good a discrimination of land cover as all seven TM bands. Based on the improved land cover classification accuracy of TM, TM data has the potential to provide more useful and effective input to US Army Corps of Engineers flood forecasting and flood damage prediction/assessment models. M.B.

N83-26178*# Clemson Univ., S.C. Dept. of Forestry.
THE ROLE OF REMOTE SENSING IN ASSESSING FOREST BIOMASS IN APPALACHIAN SOUTH CAROLINA
William Shain and Lawrence Nix *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 303-318 refs ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 02F

Information is presented on the use of color infrared aerial photographs and ground sampling methods to quantify standing forest biomass in Appalachian South Carolina. Local tree biomass equations are given and subsequent evaluation of stand density and size classes using remote sensing methods is presented. Methods of terrain analysis, environmental hazard rating, and subsequent determination of accessibility of forest biomass are discussed. Computer-based statistical analyses are used to expand individual cover-type specific ground sample data to area-wide cover type inventory figures based on aerial photographic interpretation and area measurement. Forest biomass data are presented for the study area in terms of discriminant size classes, merchant-

ability limits, accessibility (as related to terrain and yield/harvest constraints), and potential environmental impact of harvest. M.G.

N83-26179*# Minnesota Dept. of Energy, Planning and Development, St. Paul. Land Management Information Center.
AN INTEGRATION OF A GIS WITH PEATLAND MANAGEMENT
John C. Hoshal and Renee L. Johnson *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 319-327 refs Prepared in cooperation with Minnesota Dept. of Natural Resources, St. Paul. ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 08G

The complexities of peatland management in Minnesota and the use of a geographic information system, the Minnesota Land Management Information System (MLMIS) in the management process are examined. General information on the nature of peat and it quantity and distribution in Minnesota is also presented. M.G.

N83-26180*# Massachusetts Univ., Amherst. Dept. of Landscape Architecture and Regional Planning.
GEOGRAPHIC INFORMATION SYSTEMS FOR ASSESSING EXISTING AND POTENTIAL BIO-ENERGY RESOURCES: THEIR USE IN DETERMINING LAND USE AND MANAGEMENT OPTIONS WHICH MINIMIZE ECOLOGICAL AND LANDSCAPE IMPACTS IN RURAL AREAS
A. E. Jackman, J. G. Fabos, and C. C. Carlozzi *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 328-350 refs ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 05B

A management construct is described which forms part of an overall landscape ecological planning model which has as a principal objective the extension of the traditional descriptive land use mapping capabilities of geographic information systems into land management realms. It is noted that geographic information systems appear to be moving to more comprehensive methods of data handling and storage, such as relational and hierarchical data management systems, and a clear need has simultaneously arisen therefore for planning assessment techniques and methodologies which can actually use such complex levels of data in a systematic, yet flexible and scenario dependent way. The descriptive of mapping method proposed broaches such issues and utilizes a current New England bioenergy scenario, stimulated by the use of hardwoods for household heating purposes established in the post oil crisis era and the increased awareness of the possible landscape and ecological ramifications of the continued increasing use of the resource. M.G.

N83-26181*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LANDSAT APPLICATIONS FOR THE STATE OF DELAWARE
J. C. Gervin, W. A. Hallada, and R. G. Witt *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 353-370 refs ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 05B

The first phase of a cooperative demonstration project between the Eastern Regional Remote Sensing Applications Center and the Delaware Department of Natural Resources and Environmental Control is summarized. Separate land cover classifications were performed for three counties in Delaware using multiseasonal LANDSAT data from April 3 and July 20, 1974. The objective of the New Castle County and Kent County classifications was to provide general land cover information with special emphasis on existing farmland and deciduous and coniferous forest, respectively. A detailed study of existing inland and coastal wetland vegetation communities was attempted for Sussex County. Detailed accuracy assessments were conducted for general land cover in New Castle and Kent Counties and for wetland communities in Sussex County. The classifications were combined to provide a statewide Level I land cover map and acreage statistics. Based on these results, the participating state agencies determined that LANDSAT is a viable tool for mapping and monitoring land cover within the state. M.G.

N83-26182*# Dames and Moore, Los Angeles, Calif.
IMPACT OF DEMOGRAPHIC SITING CRITERIA AND ENVIRONMENTAL SUITABILITY ON LAND AVAILABILITY FOR NUCLEAR REACTOR SITING
K. L. Hansen *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 373-392 refs ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 08B

The effect of population and certain environmental characteristics on the availability of land for siting nuclear power plants was assessed. The study area, consisting of the 48 contiguous states, was divided into 5 kilometer (km) square grid cells yielding a total of 600,000 cells. Through the use of a modern geographic information system, it was possible to provide a detailed analysis of a quite large area. Numerous maps and satatistical tables were produced, the detail of which were limited only by available data. Evaluation issues included population density, restricted lands, seismic hardening, site preparation, water availability, and cost factors. M.G.

N83-26183*# West Virginia Univ., Morgantown.
MULTIDIMENSIONAL PROGRAMMING METHODS FOR ENERGY FACILITY SITING: ALTERNATIVE APPROACHES
B. D. Solomon and K. E. Haynes (Indiana Univ., Bloomington) *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 393-409 refs ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 08B

The use of multidimensional optimization methods in solving power plant siting problems, which are characterized by several conflicting, noncommensurable objectives is addressed. After a discussion of data requirements and exclusionary site screening methods for bounding the decision space, classes of multiobjective and goal programming models are discussed in the context of finite site selection. Advantages and limitations of these approaches are highlighted and the linkage of multidimensional methods with the subjective, behavioral components of the power plant siting process is emphasized. M.G.

N83-26184*# Klunder (Hans) Associates, Hanover, N.H.
AIRPHOTO INTERPRETATION AND THE SELECTION OF A POWERCHAIN RIGHT-OF-WAY IN VERMONT
Hans Klunder and Roger B. Arend (Photographic Interpretation Corp., Hanover, N.H.) *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 410-426 Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 08B

The analysis of 1:42,000 scale color infrared aerial photographs was performed to acquire data on land use, wetlands, geology, population distribution, and transportation for the purpose of locating a high voltage powerline. Maps and reference literature augmented these data with information concerning historic sites, biologically or geologically sensitive areas, planning, and zoning. With the combined data, twenty-nine corridor segments, one mile wide and varying lengths were identified. M.G.

N83-26185*# Geological Survey, Reston, Va.
POTENTIAL ROLE OF LAND USE AND LAND COVER INFORMATION IN POWERPLANT SITING: EXAMPLE OF THREE MILE ISLAND
James R. Wray *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 427-431 ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 08B

Selecting a site for a nuclear powerplant can be helped by digitizing land use and land cover data, population data, and other pertinent data sets, and then placing them in a geographic information system. Such a system begins with a set of standard-

ized maps for location reference and then provides for retrieval and analysis of spatial data keyed to the maps. This makes possible thematic mapping by computer, or interactive visual display for decisionmaking. It also permits correlating land use area measurements with census and other data (such as fallout dosages), and the updating of all data sets. The system is thus a tool for dealing with resource management problems and for analyzing the interaction between people and their environment. An explanation of a computer-plotted map of land use and cover for Three Mile Island and vicinity is given. M.G.

N83-26186*# Dames and Moore, Los Angeles, Calif.
COMPUTER-AIDED SITING OF COAL CONVERSION FACILITIES
Daniel D. Moreno *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 432-446 refs ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 08B

The value of using geographic information systems in site selection for coal conversion plants is discussed. Environmental and cultural factors and capital/operating costs were considered to determine site suitability. M.G.

N83-26187*# Earth Satellite Corp., Chevy Chase, Md.
REMOTE SENSING APPLICATIONS TO THE PENNSYLVANIA ABANDONED MINE RECLAMATION PROGRAM
Ernest Clemens and Larry Warnick *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 450-456 refs ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 08I

Pennsylvania Abandoned Mine Land Inventory demonstrated the effective use of remote sensing techniques within the context of the Surface Mining Control and Reclamation Act of 1977. The inventory combined data from field work, a literature search, and photointerpretation to fulfill both State and Federal requirements. A primary project objective was to accurately identify and map all surface features and disturbances from abandoned surface and underground mining. Black-and-white aerial photographs were used to record pits, contour benches, highwalls, spoil material, graded and recontoured areas, impounded water, and serious erosion and slide prone areas. In addition, vegetation cover estimates and surrounding land uses were noted. The inventory data base provides Pennsylvania with a valuable resource management tool that should be systematically updated. The utilization of remotely sensed data from SPOT or LANDSAT-D satellites may prove valuable in the anticipated updating and monitoring of the Pennsylvania AML inventory over the next several years. Author

N83-26188*# Ohio Univ., Athens.
A TEMPORAL APPROACH TO MONITOR SURFACE MINE RECLAMATION PROGRESS VIA LANDSAT
Anita L. Davis, Hubertus L. Bloemer, and James O. Brumfield (Marshall Univ.) *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 457-462 refs ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 08I

Using LANDSAT satellite imagery, the mine reclamation process can be studied on a temporal and continuing basis. Not only can the progress of reclamation be readily monitored, but also a breakdown in the mining reclamation process can be detected. In viewing reclamation, it is important to monitor the mined site well past initial revegation stages. With present mining law and bonding procedures, fast revegetational growth is encouraged, often leading to poor soil fertilizing and inappropriate stabilizing species. As a result, the initial reclamation may exhibit good qualities for one or two years but then may experience vegetational deterioration after the state has relinquished the mining company from it's responsibility. It is this small-scale breakdown in the reclamation process that was detected using an unsupervised classification technique with eight-year temporal LANDSAT imagery coverage. M.G.

N83-26189*# Nuclear Utility Services, Inc., Gaithersburg, Md.
OHIO'S ABANDONED MINE LANDS RECLAMATION PROGRAM: A STUDY OF DATA COLLECTION AND EVALUATION TECHNIQUES
S. L. Sperry *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 463-478 refs ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 08I

The planning process for a statewide reclamation plan of Ohio abandoned minelands in response to the Federal Surface Mining Control and Reclamation Act of 1977 included: (1) the development of a screening and ranking methodology; (2) the establishment of a statewide review of major watersheds affected by mining; (3) the development of an immediate action process; and (4) a prototypical study of a priority watershed demonstrating the data collection, analysis, display and evaluation to be used for the remaining state watersheds. Historical methods for satisfying map information analysis and evaluation, as well as current methodologies being used were discussed. Various computer mapping and analysis programs were examined for their usability in evaluating the priority reclamation sites. Hand methods were chosen over automated procedures; intuitive evaluation was the primary reason. A.R.H.

N83-26190*# Aeros Data Corp., Bethesda, Md.
REMOTE SENSING: AN INTERNATIONAL PERSPECTIVE
Marty McClure *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 481-488 refs ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 05B

The United States Government is not planning the continuation of the LANDSAT program beyond the anticipated date of 1988. Other sources of data which must ensure a continuity of information to the resource manager are environmental satellites to be launched in the next 5-10 by other entities. AEROS, and advanced Earth Resources Observation System, a private sector program, privately funded, and operated on a commercial basis, the AEROS data system, and CEDIS the combined environmental data information system are under development for the U.S. The European Space Agency's ERS-1, France's SPOT, Japan's MOS-1, Canada's RADARSAT, and India's IRS-1 satellites and their sensors are described. A.R.H.

N83-26191*# InterAmerica Research Associates, Rosslyn, Va. Project Analysis Dept.
GEOGRAPHIC INFORMATION SYSTEM IN BOLIVIA: A CASE STUDY FOR LATIN AMERICA
Pierre-Marie Adrien *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 489-499 refs ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 05B

Bolivia's Geological Service is concluding a successful project designed to give the Department of Oruro the capability to evaluate its natural resources using data generated by three United States satellites. A permanent integrated geographic information system was created for preparing base maps of soil characteristics, land use, geomorphology, geology, water resources and hydrology. The information compiled through the project was stored on magnetic disks and tapes to permit periodic updating, retrieval of data on specific aspects of development projects, and obtaining various data mixes to analyze aspects of prospective development projects. This is the first digital information system developed in Latin America. A.R.H.

N83-26192*# Earth Satellite Corp., Chevy Chase, Md.
FACTORS IN THE EFFECTIVE UTILIZATION OF A LANDSAT RELATED INVENTORY IN WEST AFRICA
Lynda Hall *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 500-507 refs ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 08B

A comprehensive LANDSAT related resource inventory was performed in parts of Ghana, Benin, and Upper Volta to determine

resource development potential in areas freed of the disease onchocerciasis. The ultimate success of the project lies in the effective use of the data by host country personnel in resource development projects. This requires project follow-through, adequate training of regional counterparts, and integration of the data into an easily used framework. Present levels of support systems and technical expertise in West Africa indicate that an automated system for natural resource data is not currently appropriate. Suggestions for the greater implementation of such inventories are explored. Author

N83-26193*# Ohio Univ., Athens.
POTENTIAL APPLICATIONS OF LANDSAT DATA IN ENERGY MANAGEMENT ASSOCIATED WITH KENYA'S FORESTS
Mughanga M. Maghenda, Hubertus L. Bloemer, and James O. Brumfield (Marshall Univ.) *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 508-517 refs ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 02F

LANDSAT can be effectively used to monitor the extent and magnitude of forest cover change in Kenya in order to evaluate the potential for energy supply. Digital processing of LANDSAT data provides a reliable monitoring technique for forest resource management in Kenya. Data analysis was used to illustrate that Kenya's forests are indeed diminishing. A model used to make projections for the availability of fuelwood as an energy source is presented. The resulting figures imply that Kenya's forest will all but disappear around the end of the 20th century. Analysis of LANDSAT data for Mau East substantiates these alarming findings. A.R.H.

N83-26194*# Ontario Centre for Remote Sensing, Toronto.
A METHOD FOR PEAT INVENTORY BASED ON LANDSAT DATA AND COMPUTERIZED MAPPING
S. Pala *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 518-534 refs Presented at the Symp. on Peat and Peatlands, Shippagan, New Brunswick, 12-15 Sep. 1982 Submitted for publication Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 05B

Wetlands were preliminarily delineated on a geometrically-corrected color composite map printed from digital LANDSAT data using a computerized color-plotting system. A digital classification was performed to identify the location and extent of wetland types (e.g., open bog, types of treed fen and black spruce-alder swamp). A map is printed from the results of this classification using the computerized color plotter. This color-coded map, produced at several different scales, provides a basis for pre-selecting field sampling sites. Helicopter-aided spot sampling based on the LANDSAT-derived map was conducted over the entire 1700 sq km area of North Ontario. Traditional transect sampling was carried out over a portion of the area, so that the two methods could be compared. Spot sampling based on the LANDSAT-derived map was found to produce results virtually identical to those produced by the transect sampling technique, in approximately one-fifteenth of the time and with a proportionate reduction in cost. A.R.H.

N83-26195*# Pennsylvania Power and Light Co., Allentown.
ENERGY FACILITY SITING BY MEANS OF ENVIRONMENTAL MODELLING WITH LANDSAT, THEMATIC MAPPER AND GEOGRAPHIC INFORMATION SYSTEM (GIS) DATA
In Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 538-540 ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 05B

Currently based on ground and aerial surveys, the land cover data base of the Pennsylvania Power and Light Company is routinely used for modelling the effects of alternative generating plant and transmission line sites on the local and regional environment. The development of a satellite-based geographic information system would facilitate both the preparation of environmental impact statements by power companies and assessment of the data by the Nuclear Regulatory Commission. A cooperative project is planned to demonstrate the methodology for integrating satellite data into an existing geographic information system, d to further evaluate the ability of satellite data in modeling environmental conditions that would be applied in the preparation and assessment of environmental impact statements. A.R.H.

N83-26196*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ENERGY REMOTE SENSING APPLICATIONS PROJECTS AT THE NASA AMES RESEARCH CENTER
S. D. Norman, W. C. Likens, and D. A. Mouat *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 543-551 refs ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 05A

The NASA Ames Research Center is active in energy projects primarily in the role of providing assistance to users in the solution of a number of problems related to energy. Data bases were produced which can be used, in combination with other sources of information, to solve spatially related energy problems. Six project activities at Ames are described which relate to energy and remote sensing. Two projects involve power demand forecasting and estimations using remote sensing and geographic information systems; two others involve transmission line routing and corridor analysis; one involves a synfuel user needs assessment through remote sensing; and the sixth involves the siting of energy facilities. A.R.H.

N83-26197*# Massachusetts Univ., Amherst. Dept. of Landscape Architecture and Regional Planning.
A METHOLOGY FOR ASSESSING THE REGIONAL TRANSPORTATION ENERGY DEMANDS OF DIFFERENT SPATIAL RESIDENTIAL DEVELOPMENT SCENARIOS: A CASE STUDY FOR THE UPPER HOUSATONIC RIVER BASIN, MASSACHUSETTS
Jonathan A. Oski, Julius Gy. Fabos, and Meir Gross *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 552-565 refs ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 05A

A method is suggested whereby regional landscape planning efforts can be aided by the use of a geographic information system to determine sites for more energy efficient residential and mixed use developments within a study area. The location of land parcels suited for residential and mixed land use developments in the Upper Housatonic River Basin Study Area in Berkshire County, Massachusetts is described as well as the three development options. Significant steps in the procedure are discussed and the computation of the transportation energy requirement is elaborated. A.R.H.

N83-26198*# Massachusetts Univ., Amherst. Dept. of Landscape Architecture and Regional Planning.
ASSESSMENT PLANNING AND EVALUATION OF RENEWABLE ENERGY RESOURCES: AN INTERACTIVE COMPUTER ASSISTED PROCEDURE
Timothy W. Aston, Julius Gy. Fabos, and E. Bruce MacDougall *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 566-588 refs ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 09B

Adaptation and derivation were used to develop a procedure for assessing the availability of renewable energy resources on the landscape while simultaneously accounting for the economic, legal, social, and environmental issues required. Done in a step-by-step fashion, the procedure can be used interactively at the computer terminals. Its application in determining the hydroelectricity, biomass, and windpower in a 40,000 acre study area of Western Massachusetts shows that: (1) three existing dam sites are physically capable of being retrofitted for hydropower; (2) each of three general areas has a mean annual windspeed exceeding 14 mph and is conductive to windpower; and (3) 20% of the total

land area consists of prime agricultural biomass while 30% of the area is prime forest biomass land. A.R.H.

N83-26199*# City of Seattle, Wash. City Light Dept.
SEATTLE'S SYSTEM FOR EVALUATING ENERGY OPTIONS
Pat Logie and Malcolm J. Macdonald *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 589-596 ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 10B

In 1975, the City Council developed a blueprint called 'Energy 1990' for meeting Seattle's future electric energy needs. Priorities for addressing or offsetting expected growth in demand are in order: (1) conservation; (2) hydroelectricity; (3) other renewable sources such as wind, biomass, solar, and geothermal energy; (4) abundant nonrenewable resources such as coal, and (5) other renewables. An energy resources planning group was formed and a data base was established. Resource options were investigated and the recommendations were published. A.R.H.

N83-26200*# Fish and Wildlife Service, Kearneysville, W. Va.
INTEGRATION OF FISH AND WILDLIFE DATA WITH GEOBASED AND REMOTELY SENSED LAND USE/LAND COVER DATA: A DEMONSTRATION USING SITES IN PENNSYLVANIA
Charles T. Cushwa, Germain LaRoche (Nuclear Regulatory Commission), and Calvin W. DuBrock (Pennsylvania Game Commission) *In* Marshall Univ. Proc. of the Natl. Conf. on Energy Resource Management, Vol. 2 1982 p 597-614 refs ERTS (For primary document see N83-26176 15-43)
Avail: NTIS HC A18/MF A01 CSCL 08B

The U.S. Fish and Wildlife Service developed a statewide fish and wildlife data base for the Pennsylvania Game Commission that includes 125 categories of information on each of the 844 species. This species data base is integrated with geobased and remotely-sensed land use/land cover data from two sites in Pennsylvania. One site is an energy development project; the other is a high-energy use area. Analyses using the combined animal and land use data bases can be demonstrated for a variety of land use/land cover types at both sites. The ability to make 'what if' analysis prior to project implementation is presented. Author

N83-26201*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
OCEAN COLOR ALGORITHM FOR REMOTE SENSING OF CHLOROPHYLL
Gary W. Grew and Leonard S. Mayo May 1983 29 p refs (NASA-TP-2164; L-15573; NAS 1.60:2164) Avail: NTIS HC A03/MF A01 CSCL 08A

An algorithm for the remote detection of chlorophyll a in the ocean was tested during a Nantucket Shoals experiment conducted by NASA. A set of Multichannel Ocean Color Sensor (MOCS) data selected from one flight for each of the two altitudes flown was used to calibrate the algorithm for chlorophyll a concentration. The equations were then applied to all unsaturated MOCS data collected during the 8-day experiment to generate contour maps of chlorophyll a concentration over the shoals. One additional flight was conducted away from the shoals both on and off the Continental Shelf. Although no solar elevation or environmental corrections were made to the original conversions, the equations in these tests determined chlorophyll a concentrations to an accuracy better than 1.0 micron g/L despite the fact that the solar elevation varied between 20 deg and 56 deg during the data collection periods of the experiments. Author

N83-26202# European Space Agency, Paris (France).
RADAR CALIBRATION
E. J. Rolfe, comp. and B. Battrick, comp. Feb. 1983 187 p refs Proc. of EARSeL, Workshop, Alpbach, Austria, 6-10 Dec, 1982; sponsored by ESA, Austrian Solar and Space Agency, and DFVLR
(ESA-SP-193; ISSN-0379-6566) Avail: NTIS HC A09/MF A01

Radar measurement and measurement instruments, coherent and noncoherent scatterometers, spaceborne scatterometers, radar altimeter calibration, real aperture radars, SAR calibration, calibration of the SAR-580 system and the active microwave instrument for ERS-I were discussed. For individual titles, see N83-26203 through N83-26215.

N83-26203# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
CALIBRATION: NEEDS AND PROBLEMS
A. J. Sieber *In* ESA Radar Calibration Feb. 1983 p 3-7 refs (For primary document see N83-26202 15-43)
Avail: NTIS HC A09/MF A01

The need for calibration derived from the applications of radar measurement and from the measurement system itself is discussed. Crop identification, crop growth, moisture determination, ice type and age, wave height, wave direction, wind speed and wind derivation are considered. Internal calibration, level two calibration and electromagnetic target signature calibration are treated.
Author (ESA)

N83-26204# Technische Hogeschool, Delft (Netherlands). Microwave Lab.
PRINCIPLES OF RADAR MEASUREMENT **c32**
L. Krul *In* ESA Radar Calibration Feb. 1983 p 11-21 refs (For primary document see N83-26202 15-43)
Avail: NTIS HC A09/MF A01

The principles of radar measurement are discussed in relation to radar calibration. Generally speaking, the instrument and the calibration standard do not present the most difficult problems. A substantial part of the analysis deals with target description. A phenomenological and a field description of extended targets is given. A symbiosis of both phenomenological and theoretical techniques by introducing the different so-called facet descriptions of extended targets is presented. Modeling by facets of finite dimensions with assumed pattern and size distribution is found most promising. Model limitations are discussed.
Author (ESA)

N83-26205# Technische Univ., Berlin (West Germany). Inst. fuer luft- und Raumfahrt.
RADAR MEASUREMENT INSTRUMENTS **c32**
Paul Hartl *In* ESA Radar Calibration Feb. 1983 P 25-44 refs (For primary document see N83-26202 15-43)
Avail: NTIS HC A09/MF A01

The radar techniques used for Earth observation are revieved. Range, direction and speed measuring techniques, and the principles of scatterometers, side-looking radar, altimeters and SAR are discussed. The ERS-1 radar package including the active microwave instrumentation and the radar altimeter are described. The analysis of the calibration problems leads to the conclusion that only the test of the system loop as a whole, besides the individual part tests, can provide a calibration in the absolute sense. Author (ESA)

N83-26206# Technische Hogeschool, Delft (Netherlands). Microwave Lab.
COHERENT AND NONCOHERENT SCATTEROMETERS **c32**
E. P. W. Attema *In* ESA Radar Calibration Feb. 1983 p 47-52 ref (For primary document see N83-26202 15-43)
Avail: NTIS HC A09/MF A01

A review of scatterometer systems used for the determination of the radar cross section per unit area of targets relevant to microwave Earth observations is presented. From a mathematical description the system transfer function are derived for systems on board moving vehicles as well as stationary platforms. It is shown that different systems may produce different answers over the same area. Measurement uncertainties and scatterometer system calibration are discussed. Author (ESA)

N83-26207# Kansas Univ., Lawrence. Remote Sensing Lab.
SPACEBORNE SCATTEROMETERS **c32**
R. K. Moore *In* ESA Radar Calibration Feb. 1983 p 53-66 refs (For primary document see N83-26202 15-43)
Avail: NTIS HC A09/MF A01

Spaceborne scatterometry and its application to wind speed

measurements over the ocean are discussed. The model function for wind response of the radar scattering coefficient, the gain pattern and pointing angle for the antenna, and the stability and absolute calibration of the radar instrument itself are examined. The role of circle flights and the importance of designing the spacecraft initial data-handling algorithm so that measurements made over buoys or other good surface-truth measurement points are automatically read into a calibration file are stressed. Antenna pattern and pointing error calibration can be done using a standard target, the best of which is the Brazilian rain forest. A method for internal calibration of the scatterometer uses a noise source, servoed to the transmitter power level, to feed calibration signals through the receiver. Author (ESA)

N83-26208# British Aerospace Dynamics Group, Bristol (England). Space and Communications Div.
RADAR ALTIMETER CALIBRATION **c32**
C. R. Francis *In* ESA Radar Calibration Feb. 1983 p 69-81 refs Sponsored by ESA (For primary document see N83-26202 15-43)
Avail: NTIS HC A09/MF A01

The operating principles and design of a radar altimeter representative of those proposed of ERS-1 are described and geophysical influences on the measurements are discussed. General aspects of calibration are examined, and the critical areas of time and frequency resolution pointed out. A method of internal calibration of delay and backscatter coefficient, by rerouting the tramsitter signal, is described. External prelaunch calibration can be carried out by airborne trials, or using a return signal simulator. It is established that airborne calibration requires high altitudes and high speeds, and is likely to be difficult and expensive. The design of a return signal simulator is shown to be very difficult. No feasible design is identified. Author (ESA)

N83-26209# Centre National d'Etudes Spatiales, Toulouse (France).
REAL APERTURE SIDE-LOOKING AIRBORNE RADAR **c32**
J. M. Lopez *In* ESA Radar Calibration Feb. 1983 p 85-94 refs (For primary document see N83-26202 15-43)
Avail: NTIS HC A09/MF A01

The history and modern evolution of SLAR, its geometry and equations, and the dynamic range problems are considered, in addition to the ways of performing radar imagery. A special technique for image speckle reduction used in the Vigie SLAR is described and illustrated. Calibration strategy is discussed around the following themes: relative or absolute; internal or external; distributed area or point target. Standard point targets such as spherical, triangular and Luneberg reflectors are discussed. The in-flight calibration campaign for the Vigie SLAR is described in detail. A discussion of measurement accuracy and recommendations for future imaging SLAR design are presented. Author (ESA)

N83-26210# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
SAR CALIBRATION: A USER'S VIEWPOINT **c32**
A. D. Goldfinger, R. C. Beal, D. E. Irvine, F. M. Monaldo, and D. G. Tilley *In* ESA Radar Calibration Feb. 1983 p 95-99 refs (For primary document see N83-26202 15-43)
Avail: NTIS HC A09/MF A01

The extent to which SEASAT SAR data meets user requirements is analyzed. The SAR system model is described. The user needs are illustrated by considering the problem of tracking and analyzing a 100 km wide storm located 1000 km from the SAR image. Required wave direction accuracy and wave number resolution are 1 deg and .002 fractional wave number. System resolution and radiometric response were studied using images of a corner reflector array. It is concluded that the SAR can measure well defined ocean swell systems with directional precision of 10 deg and wave number precision of 5%. Author (ESA)

N83-26211# Environmental Research Inst. of Michigan, Ann Arbor. Radar Div.
SAR CALIBRATION: A TECHNOLOGY REVIEW **c32**
R. W. Larson, D. T. Politis, and J. L. Walker *In* ESA Radar Calibration Feb. 1983 p 101-115 refs (For primary document see N83-26202 15-43)
Avail: NTIS HC A09/MF A01

A philosophy and approach for the calibration of a SAR system is described. The approach requires the measurement of the total system transfer function, in-flight antenna response, recording of relevant operational parameters and the monitoring of the SAR system transfer function. Calibrated reference reflectors, or reflecting areas, are utilized for the measurement of the total system transfer function and/or in-flight antenna response. A calibration signal generator provides internal calibration for the monitoring of SAR system response. Three measures of calibration performance are defined along with an outline of the calibration procedure. This procedure was applied to calibrate the ERIM SAR systems. Author (ESA)

N83-26212# Systems Designers Ltd., Fleet (England).
EXPERIENCE GAINED FROM CALIBRATION OF THE SAR-580 SYSTEM **c32**
D. G. Corr and A. M. Smith *In* ESA Radar Calibration Feb. 1983 p 119-132 refs (For primary document see N83-26202 15-43)
Avail: NTIS HC A09/MF A01

The techniques necessary to perform an absolute calibration of the airborne SAR-580 system are described. The calibration method eliminates the effects of all the system components, including the image processor and the method of power measurement from an image. It involves the use of both an internal calibration signal generator, and absolutely calibrated corner reflectors. The techniques are well illustrated at X-band. It is also found that the antenna polar diagram depends on its orientation with respect to the airframe. For experimental reasons the results are less satisfactory at C and L-band. The absence of digital data giving the absolute orientation of the antenna is a fundamental weakness of the system. Author (ESA)

N83-26213# European Space Agency, Toulouse (France). Earth Observation Program Office.
THE ACTIVE MICROWAVE INSTRUMENT (AMI) FOR ERS-1 **c35**
A. Haskell *In its* Radar Calibration Feb. 1983 p 133-140 refs (For primary document see N83-26202 15-43)
Avail: NTIS HC A09/MF A01

The functions of the AMI for ERS-1 are described. The imaging, wave and wind operating modes are outlined. The satellite configuration and the operating characteristics are discussed including the SAR, wave and wind modes, an interleaved wind-wave mode, the measurement principle, the radar reflectivity model and the derivation of calibrating requirements. It is shown that an exacting calibration strategy is needed to achieve the full system potential, and that the calibration task should be included in an early part of the project. Author (ESA)

N83-26214# Canada Centre for Remote Sensing, Ottawa (Ontario).
TRANSFER FUNCTIONS FOR PARTIALLY COHERENT SYSTEMS WITH APPLICATIONS TO SAR **c32**
Keith R. Raney *In* ESA Radar Calibration Feb. 1983 p 165-176 refs (For primary document see N83-26202 15-43)
Avail: NTIS HC A09/MF A01

An impulse response function and a transfer function applicable to partially coherent systems are presented. The general formulation is applied to synthetic aperture radar imaging systems to derive closed form results. Properties are derived for partially coherent systems that describe performance dependance on system phase and amplitude match to input signal characteristics, and to system and signal partial coherence. Such systems are shown to be energy conservative in the event of coherence variations. Output spectral properties that describe the dependance of multiplicative Rayleigh noise on input signal coherence, system coherence and phase match are presented. It is shown that the mean output from a SAR for a random distributed scene input is

not dependent on system focus, system coherence or scene coherence, whereas imagery of scene detail is dependent on these parameters. Author (ESA)

N83-26215*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
AMPLITUDE CALIBRATION OF SPACEBORNE SYNTHETIC APERTURE RADARS c32
D. N. Held *In* ESA Radar Calibration Feb. 1983 p 177-180
(For primary document see N83-26202 15-43)
(Contract NAS7-100)
Avail: NTIS HC A09/MF A01 CSCL 17I

Problems encountered during attempts to calibrate SAR imagery, recent successful experiments conducted with SEASAT SAR data, and a proposed program for the calibration and validation of the radar imagery from the forthcoming SIR-B SAR are discussed. The SEASAT SAR data for 10 passes over Death valley, California, were processed with a modified digital correlator. The procedure included a preliminary screening of the data to check for raw data saturation, compensation of waveforms and estimation of the amplitude of the pilot tone. All data was normalized to this pilot tone signal to reduce the effects of variable gains in the data links and ground receivers. The digital correlation algorithm generated image data. Evaluation of 6 passes results in a maximum pass to pass gain variation of only 1.1 dB and a standard deviation amongst the passes of 0.35 dB. Author (ESA)

N83-26216# Edinger (John E.) Associates, Inc., Wayne, Pa.
DEVELOPMENTS IN LARM2: A LONGITUDINAL-VERTICAL, TIME-VARYING HYDRODYNAMIC RESERVOIR MODEL Final Report
John E. Edinger and Edward M. Buchak Jan. 1983 71 p refs
(Contract DACW39-78-C-0057)
(AD-A124442; WES-TR-E-83-1) Avail: NTIS HC A04/MF A01 CSCL 09/2

A two-dimensional, laterally averaged reservoir hydrodynamic model, LARM, was modified to provide several enhancements. The two major enhancements made to the numerical model were the incorporation of a water quality transport module (WQTM) and the capability to add or delete upstream longitudinal segments during flooding or drawdown. WQTM is a general-purpose transport algorithm for which the user must specify the water quality constituents and the constituent internal sources and sinks with the associated reaction rates. Included within the report are discussion of previous LARM applications and recommendations for future development. The version of the LARM code that resulted from this effort is referred to as LARM2. In addition to the developments reported herein, there is a user guide for LARM2 entitled 'User Guide for LARM2: A Longitudinal-Vertical, Time-Varying Hydrodynamic Reservoir Model' (Buchak and Edinger, 1981). Author (GRA)

N83-26217# Edinger (John E.) Associates, Inc., Wayne, Pa.
USER GUIDE FOR LARM2: A LONGITUDINAL-VERTICAL, TIME-VARYING HYDRODYNAMIC RESERVOIR MODEL Final Report
Edward M. Buchak and John E. Edinger Dec. 1982 95 p refs
(Contract DACW39-78-C-0057)
(AD-A124441; WES-INSTRUCTION-E-82-3) Avail: NTIS HC A05/MF A01 CSCL 09/2

A two-dimensional, laterally-averaged reservoir hydrodynamic model, LARM, was modified to provide several enhancements. The two major enhancements made to the numerical model were the incorporation of a water quality transport module (WQTM) and the capability to add or delete upstream longitudinal segments during flooding or drawdown. WQTM is a general-purpose transport algorithm for which the user must specify the water quality constituent with sources and sinks and the associated reaction rates. This user's guide contains an overall view of LARM2, a summary of its theoretical basis, a description of its application procedure, and an example. The appendices contain an input data description with examples and user notes for two auxiliary codes. In addition to this guide, there is a more detailed description of the modified model entitled 'Developments in LARM2: A Longitudinal-Vertical, Time-Varying Hydrodynamic Reservoir Model' (Edinger and Buchak 1983). GRA

N83-26218# Defense Mapping Agency Hydrographic and Topographic Center, Washington, D.C.
DEVELOPMENTAL EFFORTS TO IMPROVE THE ACCURACIES OF GEODETIC AND GEOPHYSICAL SURVEYS
Feb. 1983 36 p refs
(AD-A124744) Avail: NTIS HC A03/MF A01 CSCL 08/5

The Defense Mapping Agency (DMA) performs major geodetic and geophysical surveys to support the mapping, charting, and geodesy requirements of the Department of Defense. These survey requirements are often at the edge of the state-of-the-art and require extensive DMA involvement in the development and testing of new survey methodology. This paper covers the results of recent test and evaluation programs involving prototype and state-of-the-art production instrumentation for astronomic position and azimuth determinations, multi wavelength distance measurements, and improvements in gravity measurements. The treatment of principal error sources in astronomic positioning through the use of the recently developed charge coupled device eyepiece to eliminate personal equation bias, the investigation of precise astrolabes, the establishment of precise astronomic reference stations, and the status of current research for the developement of a two color refractometer to correct for anomalous atmospheric refraction are discussed. Also covered are the acceptance tests and future plans for the improvement of distance measurement (Terrameter). Brief discussions of DMA's participation in programs to improve the U.S. Gravity Base Network, the acquisition, reduction, and adjustment of relative gravity surveys, and support to the field testing of an absolute gravity apparatus are included. GRA

N83-26219# Army Cold Regions Research and Engineering Lab., Hanover, N. H. Snow and Ice Branch.
RADAR DETECTION OF ICE WEDGES IN ALASKA
Steven A. Arcone, Paul V. Sellmann, and Allan J. Delaney Dec. 1982 23 p refs
(DA Proj. 4A7-62730-AT-42)
(AD-A124571; CRREL-82-43) Avail: NTIS HC A02/MF A01 CSCL 08/12

The radar signatures of ice wedges and wedge-like structures have been investigated for a variety of soil conditions. The radar used for this study emitted short sinusoidal pulses of about 10-ns duration with an approximate center frequency of 150 MHz. Most of the ice wedges existed at depths of about 1 m in a variety of silty and sandy soils with both frozen and thawed active layers. The position of the wedges was usually identified from corresponding surface features. An artificial ice wedge in coarse-grained alluvium was also profiled as well as wedge-like structures of fine silt in a coarse-grained glacial outwash. All wedges and wedge-like structures produced a hyperbolic reflection profile except when an active layer of thawed, saturated silt was present which eliminated returns from the wedges. The peaks of the hyperbolas were sometimes masked by reflections from the permafrost table or other material interfaces, and multiple hyperbolas occurred at some sites. The dielectric constant of the host medium was often calculated from the linear portions of the hyperbolas and the results were verified by laboratory time domain reflectometry measurements performed on field samples. In some cases, hyperbolic profiles originated at several meters depth suggesting that deep ice wedges could be detected in areas of cold permafrost. GRA

N83-26220# Naval Postgraduate School, Monterey, Calif. Dept. of Oceanography.
THERMAL CALIBRATION OF SATELLITE INFRARED IMAGES AND CORRELATION WITH SEA-SURFACE NUTRIENT DISTRIBUTION M.S. Thesis
Vitor Martinho F. Pereira e Silva Jun. 1982 65 p refs
(AD-A123780) Avail: NTIS HC A04/MF A01 CSCL 08/2

Satellite infrared imagery off the California coast, near Pt. Sur, show thermal patterns associated with an upwelling center; the patterns frequently curl cyclonically when interacting with the

warmer California Current. This pattern shows sharp thermal fronts, easily identified in satellite IR images, that are strongly correlated with nutrient fronts during the early stages of upwelling. With sea truth data available, it was feasible to calibrate satellite derived sea surface temperature, by applying radiative transfer theory, and to infer nutrient concentrations from their linear inverse correlations with temperature. Thus, it was possible to calibrate satellite thermal fields to produce maps of nutrient distributions. When the inferred relationships were applied over representative regions of the upwelling center, standard deviations of 0.5C, 1.7 microns and 0.1 microns were computed for temperature, nitrate and phosphate, respectively. Author (GRA)

N83-26221# Army Engineer Topographic Labs., Fort Belvoir, Va. Center for Remote Sensing.
VEGETATIVE COVER EFFECTS ON SOIL SPECTRAL REFLECTANCE
Melvin B. Satterwhite, Ponder Henley, and Miklos Treiber Mar. 1982 41 p refs
(DA Proj. 4A1-61102-B-52C)
(AD-A123817; ETL-0284) Avail: NTIS HC A03/MF A01 CSCL 20/6

The reflectance characteristics in the 400 to 1100 nm region of two different soil types and the effect of varying vegetative cover on each are described. The spectral reflectance of the test sites was proportional to the cover and highly dependent on soil color. A cover of 24-35 percent was required to affect significantly the spectral reflection (400 to 1100 nm) of the background soil types. Equations for these relations are given. GRA

N83-26222# Naval Ocean Research and Development Activity, Bay St. Louis, Miss. Polar Oceanography Div.
POSSIBLE APPLICATIONS OF GEOSAT-A RADAR ALTIMETER DATA TO ICE FORECASTING IN POLAR REGIONS Final Report
Duane T. Eppler Nov. 1982 19 p refs
(AD-A124029; NORDA-TN-177) Avail: NTIS HC A02/MF A01 CSCL 08/12

Backscatter data recorded by satellite-borne radar altimeters that cross polar regions are potential sources of information that can be used to assess the general character of the ice pack, to locate the edge of ice-covered seas, and to delineate polynyas, leads, and areas of open water within the pack. Use of the GEOSAT-A altimeter to acquire these data is severely limited, however, by failure of the instrument to track over ice, the large footprint size characteristic of the satellite sensor (2 km to 7 km), and coverage to only 72 deg latitude. Use of the radar altimeter as a Ku-band microwave scatterometer might permit ice surface roughness and age to be predicted from backscatter waveforms. Extraction of this information requires either that the satellite be re-designed to track over ice, or that numerical methods be developed to rectify distorted waveforms acquired over ice. In contrast, ice-water boundaries will be recorded clearly in the backscattered signal by virtue of increases in noise that result from the absence of tracking capability. The precision with which ice edges can be located and the accuracy with which marginal ice zones conditions can be predicted are limited, however, by the altimeter footprint size. GRA

N83-26223# Defense Mapping Agency Hydrographic and Topographic Center, Washington, D.C.
DMA'S PROTOTYPE GRAPHICS FROM ENHANCED LANDSAT IMAGERY FOR APPLICATION TO HYDROGRAPHIC CHARTING Progress Report, 5-8 Apr. 1983
Alonzo D. Naylor and William H. Lafollette 8 Apr. 1983 31 p refs
(AD-A124123) Avail: NTIS HC A03/MF A01 CSCL 08/2

The Defense Mapping Agency (DMA) is currently developing prototype graphics from remotely sensed imagery for support to hydrographic survey planning and DMA's nautical chart maintenance program. The imagery for these prototypes is LANDSAT scenes that are enhanced by digital image processing techniques, or processed totally in an analog mode for quick response requirements. This paper discusses these processing approaches within the framework of the prototype efforts. LANDSAT's multispectral scanner imagery in the Makassar Strait of Indonesia is computer enhanced to highlight hydrographic information such as shoals, uncover areas, land-water boundaries, and shallow water depth intervals. These enhancements are graphically presented in a variety of scales, formats, and color assignments representing three approaches to computer enhancements. To produce quick response graphics, the analog approach to enhancement involves the use of a color additive viewer and multiscale projector/viewer for analysis of multispectral/multitemporal LANDSAT film. The prototype graphics using this approach were developed to support DMA's chart maintenance program, but could be used as a tool for survey planning in shallow waters. GRA

N83-26224# Army Electronics Research and Development Command, Fort Monmouth, N. J. Electronic Warfare Lab.
REMOTE ATTITUDE MEASUREMENT TECHNIQUES Ph.D. Thesis
Frank J. Elmer Dec. 1982 179 p refs
(AD-A123852; DELET-TR-82-5) Avail: NTIS HC A09/MF A01 CSCL 14/2

A probablistic approach is developed to treat practical problems in physical geometry where the necessary data are measured by separated sensors. Remote measurement of the attitude of these sensors is necessary to transform directional information reported in the sensor's own local coordinate system into its equivalent description in a common coordinate system. A technique is presented to determine the relative attitude of remotely located sensor's based upon each sensor measuring the same set of two physical vectors. A physical vector represents a direction in space. Sensors measure physical vectors in terms of probablistic vectors. The attitude of the sensor is expressed in terms of a probablistic matrix. The engineering considerations for implementing a Remote Attitude Measurement, ReAtMent, system are presented including the development of an error budget necessary to insure that the ReAtMent system performs to the required accuracy. GRA

N83-26225# Army Cold Regions Research and Engineering Lab., Hanover, N. H. Snow and Ice Branch.
THE GROWTH, STRUCTURE, AND PROPERTIES OF SEA ICE
W. F. Weeks and S. F. Ackley Nov. 1982 140 p refs
(AD-A123762; CRREL-MONO-82-1) Avail: NTIS HC A07/MF A01 CSCL 08/2

This monograph describes in some detail the current state of knowledge of the observed variations in the structural characteristics (grain size, crystal orientation, brine layer spacing) and composition (brine, gas and solid salts) of sea ice as well as the presumed causes of these variations. The importance of these variations in controlling the large observed changes in the mechanical, thermal and electrical properties of sea ice is also discussed. Author (GRA)

N83-26226# Energy Information Administration, Washington, D.C. Office of Coal, Nuclear, Electric and Alternate Fuels.
OUTLOOK FOR US COAL
Ercan Tukenmez and Mary K. Paull Aug. 1982 47 p
(DE82-020509; DOE/EIA-0333) Avail: NTIS HC A03/MF A01

This report on the outlook for US coal summarizes the historical development of coal in the United States from both the supply and demand perspectives. The report traces coal use from the 1800's, when it displaced wood, through the 1900's, when oil and natural gas, (cleaner and, until recently, cheaper) became the primary fuels. Projections from EIA's 1981 Annual Report to Congress, Volume 3, show that coal is expected to regain a dominant position as a domestic fuel source. These projections and factors affecting coal's future growth are discussed in this report. DOE

N83-26227# Bendix Field Engineering Corp., Grand Junction, Colo.
NATIONAL URANIUM RESOURCE EVALUATION: URANIUM HYDROGEOCHEMICAL AND STREAM-SEDIMENT RECONNAIS-

SANCE OF THE SHISHMAREF NTMS QUADRANGLE, ALASKA
Jul. 1982 24 p refs Prepared in cooperation with Los Alamos Scientific Lab., N. Mex.
(Contracts DE-AC13-76GJ-01664; W-7405-eng-36)
(DE82-020189; GJBX-141-82) Avail: NTIS HC A02/MF A01

A hydrogeochemical and Stream Sediment Reconnaissance (HSSR) of the Shishmaref NTMS quadrangle was reported. Location data field analyses and laboratory analyses of several different sample media are presented. The sample media and the analytical results for each medium are summarized. The data are divided into groups of stream sediment, lake sediment, stream water, and lake water samples. For each group which contains a sufficient number of observations, statistical tables, tables of raw data, and 1:1,000,000 scale maps of pertinent elements and maps showing results of multivariate statistical analyses are included.
DOE

N83-26228# Centre de Recherches en Physique de l'Environnement, Issy-les-Moulineaux (France).
ESTIMATION OF THE EVAPORATION OF BARE SOIL FROM C-BAND DIFFUSION METER READINGS OF ITS SURFACE HUMIDITY, USING A NUMERICAL MODEL OF HYDROUS TRANSFERS IN THE SOIL [ESTIMATION DE L'EVAPORATION D'UN SOL NU A PARTIR DU SUIVI DE SON HUMIDITE DE SURFACE PAR UN DIFFUSIOMETRE EN BANDE C, EN UTILISANT UN MODELE NUMERIQUE DE TRANSFERTS HYDRIQUES DANS LE SOL]
Laurent Prevot Sep. 1982 91 p refs In FRENCH
(CRPE-NT-119) Avail: NTIS HC A05/MF A01

Daily data on the water content at the surface of bare soil are used as the upper limit condition for a numerical model of hydrous transfer in the soils. A finite difference approach is used to solve the nonlinear diffusion equation for hydrous transfer in the unsaturated zones of the soil. The soil is represented as a medium with two superposed strata of differing hydraulic conductivity. The model is adjusted by companing the calculated water content profiles with those measured by neutron probes. Fluxes at the system limits are obtained as output. Evaporation is calculated with no atmosphere hypotheses and with accuracy equal to that obtained by estimates based on neutron measurement of water content. Author (ESA)

N83-26229# Centre de Recherches en Physique de l'Environnement, Issy-les-Moulineaux (France).
COMPARISON OF THREE IN SITU SURFACE SOIL MOISTURE MEASUREMENTS AND APPLICATION TO C BAND SCATTEROMETER CALIBRATION
R. Bernard, O. Taconet, D. Vidal-Majar, J. L. Thony (IMG, Grenoble, France), M. Vauclin (IMG, Grenoble, France), A. Chapoton (Universite des Sciences et des Techniques, Villeneuve d'Asco, France), F. Wattrelot (Universite des Sciences des Techniques, Villeneuve D'Asco, France), and A. Lebrun (Universite des Sciences et des Techniques, Villeneuve D'Asco, France) Oct. 1982 24 p refs Submitted for publication Sponsored by CNES
(CRPE-NT-120) Avail: NTIS HC A02/MF A01

Surface gamma neutron probe, tensiometer and dielectric constant probe surface moisture measurements were compared to gravimetric sampling and C band scatterometer measurements, in order to find a system for ground truths during air or satellite-borne soil moisture experiments. Results for the three techniques are similar, but the dielectric probe is entirely automatic. Radar data calibrated with gravimetric sampling are comparable with dielectric measurements. Author (ESA)

N83-26230# Swedish Space Corp., Solna.
REMOTE SENSING IN SWEDEN THROUGH THE MID-80'S
Aug. 1982 61 p Original contains color illustrations
Avail: NTIS HC A04/MF A01

The Swedish remote sensing program is outlined. Maritime surveillance, air pollution monitoring, meteorology, land applications, and cooperation with developing countries are discussed. Technology and methodology development, and information, education and research progams are outlined. Author (ESA)

N83-26231# Universite des Sciences et Techniques de Lille (France). Lab. d'Optique Atmospherique.
OVERVIEW OF PROBLEMS LINKED TO PRECISE DETERMINATION OF CHLOROPHYLL CONCENTRATION FROM A SATELLITE [RECENSEMENT DES PROBLEMES LIES A UNE DETERMINATION PRECISE DE LA CONCENTRATION EN CHLOROPHYLLE A PARTIR D'UN SATELLITE]
M. Viollier, D. Tanre, and P. Y. Deschamps Paris ESA Apr. 1982 28 p refs In FRENCH
(Contract ESA-4689/81/F-DD(SC))
(ESA-CR(P)-1688) Avail: NTIS HC A03/MF A01

Scientific problems and instrument difficulties associated with the ERS-1 ocean color monitor project are reviewed. Topics covered include: definition of end products to be distributed to users; review of problems related to the determination of these products; definition of experiment programs needed to validate algorithms; and atmospheric corrections required for the 400 nm experimental channel. Author (ESA)

N83-26232# Marconi Co. Ltd., Chelmsford (England). Research Center.
SPECTRAL QUALITY FOR AMI WAVE MODE Final Report
J. T. Macklin Paris ESA May 1982 52 p refs Original contains color illustrations
(Contract ESA-4813/81/F-DD(SC))
(MTR-82/61; ESA-CR(P)-1689) Avail: NTIS HC A04/MF A01

The ERS-1 synthetic aperture radar spectral quality is discussed. Parameters describing the accuracies in wavelengths and intensities of features in the spectrum were defined by analogy with the description of image quality. The effect of the restriction on transmitter power on spectral quality was considered. The signal to noise ratio (S/N) in a resolution element required for optimum spectral radiometric resolution was derived; $S/N = 1$ is best for the amplitude spectrum of a uniform target but $S/N = 3$ is best for its power spectrum. It is suggested, however, that there is little point in operating with $S/N > 1$. Computer simulations of power spectra of complex targets give results similar to those for uniform targets. The error in the total signal is the same as that in a uniform target with the same total signal. Hence the S/N at a given wavelength is degraded if structure is introduced at another wavelength, so the radiometric quality of ERS-1 spectra depend on the nature of the target. Author (ESA)

N83-26233# Marconi Co. Ltd., Chelmsford (England).
SEA SURFACE IMAGING BY SAR Final Report
S. Rotheram Paris ESA Sep. 1982 132 p refs Original contains color illustrations
(Contract ESA-4814/81/NL-PP(SC))
(MTR-82/102; ESA-CR(P)-1716) Avail: NTIS HC A07/MF A01

The mechanisms whereby a SAR forms images of waves on the sea surface were analyzed. Representations of sea surface gravity waves are formed using two scale perturbation, Rytov and WKB expansions. These describe short gravity wave fields which are phase and amplitude modulated by long gravity waves. Similar representations are found for the scattered electromagnetic field. These are combined with a simple SAR model and imaging mechanisms are studied. Linear imaging of a long wave field and nonlinear imaging of a single long wave are investigated. It is shown that nonlinear imaging leads to the smearing of SAR images and the azimuthal banding of SAR spectra. A simple linear inverse thoery is given and alternative methods of forming SAR images are described. A linear inverse method is applied to three SEASAT SAR images. One of the images shows azimuthal banding and harmonics. Author (ESA)

N83-26234# European Space Agency, Paris (France).
HRV AND MRVIR CALIBRATION
Magdeleine Dinguirard and Jean-Michel Maisonneuve Feb. 1983 69 p refs Transl. into ENGLISH of "Calibration HRV et MRVIR" ONERA, Toulouse Report CERT-5/6035-DERO, Jul. 1977
(ESA-TT-792; CERT-5/6035-DERO) Avail: NTIS HC A04/MF A01

Calibration of SPOT remote sensing cameras by the calibra-

tion chain method is discussed. Component specifications are evaluated according to the radiometric specifications of the instruments. Absolute calibration is feasible since the accuracy required in the absolute knowledge of the luminance of sources is 6% while source accuracy is within 4%. For relative calibration from band to band. The accuracy is 3% which just satisfies the specifications required at the bottom of the dynamic range but not those at the top of the range where the accuracy required is 1.6%. Relative calibration of sensors in the same spectral band, based on one measurement on an onboard source, does not allow the specifications to be met whatever the quality of the sources used, as measurement chain inaccuracy limits the overall accuracy. Author (ESA)

N83-26235# European Space Agency, Paris (France).
HRV AND MRVIR CALIBRATION
Magdeleine Dinguirard and Jean-Michel Maisonneuve Apr. 1983 48 p refs Transl. into ENGLISH of "Calibration HRV et MRVIR" ONERA, Toulouse Report CERT-9/6035-DERO
(ESA-TT-793; CERT-9/6035-DERO) Avail: NTIS HC A03/MF A01

The accuracy of SPOT HRV camera calibration measurement on an internal lamp or test sites was assessed, based on mission specifications relating to the flux at the entrance to the telescope, and not the light level on the ground, and a reevaluation of the calibration signal error, which after a large number of measurements is reduced to a digitizing error. It is shown that digitizing using a large number of bits makes cooling the detectors unnecessary. The internal source should be viewed by detectors following the same optical path as for the terrain. The flux homogeneity specification from the external calibration source precludes the use of sunlight. The use of test sites for absolute recalibration of the lamp and relative recalibration between spectral bands is advocated. Author (ESA)

N83-26236# Geological Survey, Austin, Tex. Water Resources Div.
WATER RESOURCES DATA FOR TEXAS, WATER YEAR 1981. VOLUME 3: COLORADO RIVER BASIN, LAVACA RIVER BASIN, GUADALUPE RIVER BASIN, NUECES RIVER BASIN, RIO GRANDE BASIN, AND INTERVENING COASTAL BASINS
H. D. Buckner, comp., E. R. Carrillo, comp., and H. Davidson, comp. Sep. 1982 615 p refs 3 Vol.
(PB83-152025; USGS/WRD/HD-82/070-Vol-3; USGS-WDR-TX-81-3-Vol-3) Avail: NTIS HC A99/MF A01 CSCL 08H

Surface-water data for the 1981 water year for Texas are presented in three volumes, appropriately identified as to content by river basins. Data in each volume consist of records of stage, discharge, and water quality of streams and canals; and stage, contents, and water quality of lakes and reservoirs. Also included are crest-stage and flood-hydrograph partial-record stations, reconnaissance partial-record stations, and low-flow partial-record stations. Author (GRA)

N83-26237# Delaware River Basin Commission, Trenton, N.J.
SPECIAL GROUND WATER STUDY (DELAWARE) BASINWIDE REPORT AND EXECUTIVE SUMMARY
Dec. 1982 184 p refs Prepared in cooperation with Water Resources Council, Washington, D.C.
(PB83-153262) Avail: NTIS HC A09/MF A01 CSCL 08H

Summary of technical data and findings regarding three ground water zones in Delaware River Basin and recommends a management program which provides for both optimal use of ground water and protection of the ground water resource and interrelated surface regime. Recommendations provide technical criteria for more uniform regulatory functions among the Commission and signatory parties to protect the available quality and quantity of ground water, and to regulate water withdrawals and use in a responsible and equitable manner. GRA

N83-26238# Dames and Moore, Anchorage, Alaska.
NATURAL RESOURCE PROTECTION AND PETROLEUM DEVELOPMENT IN ALASKA
Peter T. Hanley, James E. Hemming, John W. Morsell, Thomas A. Morehouse (Inst. of Social and Economic Research, Anchorage, Alaska), Linda E. Leask (Inst. of Social and Economic Research, Anchorage, Alaska), and Gordon S. Harrison (Harrison (Gordon S.) and Associates, Tacoma, Wash.) Aug. 1981 327 p refs (Contract DI-14-16-0009-79-123)
(PB83-150748; FWS/OBS-80/22; LC-82-600620) Avail: NTIS HC A15/MF A01 CSCL 08I

Administrative roles, authorities, procedures, and decisionmaking processes for oil and gas leasing and post-lease environmental management for both the State and Federal governments are reviewed. Past and present oil exploration and development efforts in Alaska, and a general assessment of the most promising areas for future exploration are reviewed. Two case studies of petroleum development and environmental management in Alaska are given; the Kenai National Moose Range in southcentral Alaska and the National Petroleum Reserve in northern Alaska. GRA

N83-26239# Geological Survey, Charleston, W. Va. Water Resources Div.
WATER RESOURCES DATA FOR WEST VIRGINIA, WATER YEAR 1981 Annual Report, 1 Oct. 1980 - 30 Sep. 1981
Aug. 1982 514 p
(PB83-148882; USGS/WRD/HD-81/059; USGS-WDR-WV-81-1) Avail: NTIS HC A22/MF A01 CSCL 08H

Water resources data for the 1981 water year for West Virginia consist of records of stage, discharge, and water quality of streams and springs; stage and contents of lakes and reservoirs; and water levels in wells. This report contains discharging records for 120 gaging stations; stage only records for 8 gaging stations; stage and contents for 8 lakes and reservoirs; contents for 1 reservoir; change in contents for 1 reservoir; water quality for 103 gaging stations; and water levels for 25 observation wells. Also includes are 2 crest-stage partial-record stations, and 1 low-flow partial record station. Author (GRA)

N83-26240# Geological Survey, Nashville, Tenn. Water Resources Div.
WATER RESOURCES DATA FOR TENNESSEE, WATER YEAR 1981 Annual Report, 1 Oct. 1980 - 30 Sep. 1981
Jul. 1982 500 p
(PB83-145052; USGS/WRD/DH-81/045; USGS-WDR-TN-81-1) Avail: NTIS HC A21/MF A01 CSCL 08H

Water resources data for the 1981 water year for Tennessee consist of records of stage, discharge, and water quality of streams and springs; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of wells. This report contains discharge records for 114 gaging stations; stage only records for one lake gaging station; elevation and contents for 27 lakes and reservoirs; water quality for 73 stations and 45 wells; and water levels for 30 observation wells. Also included are 127 crest-stage partial-record stations, 77 low-flow partial-record stations, and 81 coal-hydrology partial-record stations. Author (GRA)

N83-26241# Geological Survey, Hartford, Conn. Water Resources Div.
WATER RESOURCES DATA, CONNECTICUT, WATER YEAR 1981 Annual Report, 1 Oct. 1980 - 30 Sep. 1981
Apr. 1982 337 p
(PB83-144352; USGS/WRD/HD-82-022; USGS-WDR-CT-81-1) Avail: NTIS HC A15/MF A01 CSCL 08H

Water Resources Data for the 1981 water year for Connecticut consist of records of stage, discharge, and water quality of streams; stage, contents and water quality of lakes and reservoirs; and water levels and water quality of ground-water wells. This volume contains records for water discharge at 55 gaging stations; storm discharge at 7 gaging stations; tidal volume at 1 gaging station; contents at 35 lakes and reservoirs; water quality at 40 gaging stations, 4 lakes and reservoirs, 2 harbors, and 16 wells; and water levels at 58 observation wells. GRA

N83-26242# Geological Survey, Bismarck, N. Dak. Water Resources Div.
WATER RESOURCES DATA, NORTH DAKOTA, WATER YEAR 1981. VOLUME 2: MISSOURI RIVER BASIN Annual Water Data Report, 1 Oct. 1980 - 30 Sep. 1981
Sep. 1982 503 p
(PB83-140236; USGS/WRD/HD-82-011; USGS-WDR-ND-81-2) Avail: NTIS HC A22/MF A01 CSCL 08H

Water resources data for the 1981 water year for North Dakota consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of ground water. Volume 2 of this report contains 78 gaging stations; stage only records for 17 gaging stations; stage and contents for 7 lakes and reservoirs; water quality for 55 gaging stations; 14 partial-record stations, 12 lakes, 63 wells, and water levels for 14 observation wells. Author (GRA)

N83-26243# Rutgers - The State Univ., New Brunswick, N. J. Center for Coastal and Environmental Studies.
THE DEVELOPMENT OF PHYTOPLANKTON POPULATIONS AND NUTRIENTS IN A TIDAL RIVER UNDER DROUGHT CONDITIONS
Mary Ann Foote and Robert E. Loveland Sep. 1982 120 p refs
(Contract DI-14-34-0001-1132)
(PB83-140053; W83-01283; OWRT-A-063-NJ(1)) Avail: NTIS HC A06/MF A01 CSCL 08H

Chemical and physical measurements were made at 6 stations along a 15 km segment of the upper Hackensack River from July 1980 to October 1981. Temperature, salinity, and concentrations of nitrate-nitrogen, ortho-phosphate, total hardness, alkalinity, silica and sulfate were all greater towards the lower end of the estuary. Dissolved oxygen concentrations were generally greater upstream. Ninety nine species of planktonic algae were identified. Diversity was sightly lower in the upper estuary during the summer months. The Hackensack River as a source of potable water is also investigated. Author

N83-26244# Massachusetts Univ., Amherst. Water Resources Research Center.
USE AND LIMITATIONS OF SEDIMENTARY PIGMENTS AS INDICATORS OF PAST LAKE PRODUCTIVITY
Stuart D. Ludlam Jun. 1982 72 p refs
(Contract DI-14-34-0001-9117)
(PB83-139683; PUB-127; W83-01237; OWRT-B-068-MASS(1)) Avail: NTIS HC A04/MF A01 CSCL 08H

The horizontal distribution of sedimentary pigments was investigated in 6 Massachusetts lakes, 4 in the Berkshire Hills and 2 on Cape Cod. The concentration of sedimentary chlorophyll and carotenoids in the most surficial sediment was directly related to sestonic chlorophyll a, water depth and length of hypolimnetic anoxia. The occurrence of an abundant littoral flora increased shallow water sedimentary pigment concentration but had little effect on deep water sediment in these lakes. The above relationships were used in interpreting the history of lake productivity from 1 m long sedimentary pigment profiles in 5 of the 6 lakes. Author (GRA)

N83-26245# Greenhorn and O'Mara, Inc., Riverdale, Md.
TECHNICAL MANUAL FOR GROUNDWATER EXPLORATION IN ARID AND SEMIARID REGIONS USING LANDSAT VISUAL AND DIGITAL ANALYSES
Judith A. Monte and Daniel I. Cooper Aug. 1982 159 p refs
(Contract DI-14-34-0001-1479)
(PB83-146373; W83-01356; OWRT-C-10058-G(1479)(1)) Avail: NTIS HC A08/MF A01 CSCL 13B

A viable addition to traditional methods of identifying exploratory groundwater test well sites is the use of visual and digital LANDSAT remote sensing technology as an investigative technique. Areas of groundwater discharge are easily recognized from LANDSAT; they provide valuable clues for defining potential groundwater drilling sites. The research coupled computer assisted digital image analysis, using an albedo transform in a time series mode, to existing visual qualitative investigative techniques of LANDSAT data, and investigated the value of applying non-traditionally used groundwater terrain indicators, such as phreatophytic vegetation and soil moisture to groundwater exploration. Southwestern New Mexico, with its basin and range topography, comprised the project area that was subjected to research investigations, reconnaissance and ground verification of LANDSAT imagery. Combined visual and digital analyses resulted in maps that specify sites recommended for drilling. GRA

N83-26246# General Accounting Office, Washington, D. C. Resources Community Economic Div.
DUPLICATIVE FEDERAL COMPUTER-MAPPING PROGRAMS: A GROWING PROBLEM
22 Nov. 1982 61 p refs
(PB83-150953; GAO/RCED-83-10; B-209466) Avail: NTIS HC A04/MF A01 CSCL 08B

In recent years many Federal agencies have begun to use the computer to prepare maps and analyze the information on them. Because the principal Federal civilian mapper, the U.S. Geological Survey, has not had enough funds to keep pace with other Federal agencies' demand for computerized versions of its maps, other Federal agencies have had to develop them on their own. This has resulted in duplicative mapping programs and lost savings opportunities. The problem will get worse as computer mapping expands in the Federal Government. GAO is recommending a number of actions to eliminate further unnecessary Federal costs. Author (GRA)

N83-26247# Geological Survey, Austin, Tex. Water Resources Div.
WATER RESOURCES DATA FOR TEXAS, WATER YEAR 1981. VOLUME 2: SAN JACINTO RIVER BASIN, BRAZOS RIVER BASIN, SAN BERNARD RIVER BASIN, AND INTERVENING COASTAL BASINS Water Data Report, 1 Oct. 1980 - 30 Sep. 1981
H. D. Buckner, E. R. Carrillo, and H. Davidson Sep. 1982 525 p
(PB83-152017; USGS/WRD/HD-82-069-Vol-2;
USGS-WDR-TX-81-2) Avail: NTIS HC A22/MF A01 CSCL 08H

Surface-water data for the 1981 water year for Texas are presented in three volumes, appropriately identified as to content by river basins. Data in each volume consist of records of stage, discharge, and water quality of streams and canals; and stage, contents, and water quality of lakes and resevoirs. Also included are crest-stage and flood-hydrograph partial-record stations, reconnaissance partial-record stations, and low-flow partial-record stations. Author (GRA)

N83-26248# Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
ASPECTS OF AQUIFER TEST ERROR ANALYSIS
Ahmed Mohamed BenBarka 1982 202 p refs Prepared for Office of Water Research and Technology, Washington, D.C.
(PB83-150292; OWRT-B-073-ARIZ(2)) Avail: NTIS HC A10/MF A01 CSCL 08H

Fitting parameters to aquifer models may produce parameter estimates that contain significant errors. These errors result from a relatively limited number of measurements that can be inaccurate, from the use of a wrongly or incompletely specified model, or from inefficient methods of fitting employed to estimate the hydraulic parameters. Measurement errors in pumping rate and water levels were studied experimentally. Statistical analysis revealed that they were normally distributed. For water level measurement error, the error variance was proportional to depth. Two types of estimation techniques were used; graphical and automatic methods. GRA

N83-26249# Nevada Univ., Reno. Desert Research Inst.
HYDROLOGIC INTERPRETATION OF SHALLOW SUBSURFACE TEMPERATURE DATA
N. L. Ingraham, R. L. Jacobson, and M. E. Campana Aug. 1982 44 p refs
(Contract DI-14-34-0001-0130)
(PB83-150136; PUB-41076; W83-01605; OWRT-A-094-NEV(A))

Avail: NTIS HC A03/MF A01 CSCL 08H

The temperature of shallow holes (1 meter) in a portion of Dixie Valley, Nevada, were monitored for a period of almost two years; ten monthly surveys were conducted, in which as many as 219 holes were measured per month. The temperatures were used to delineate infiltration/recharge events and areas of suspected subsurface mountain-front recharge in the study region. The data indicated that qualitative delineation of infiltration events from flash floods is possible, as certain alluvial fans showed marked depression of shallow temperatures in the wake of the floods, but it was impossible to determine whether or not these infiltration events resulted in groundwater recharge. Author (GRA)

N83-26250# Geological Survey, Sacramento, Calif. Water Resources Div.

GROUND WATER IN THE SEASIDE AREA, MONTEREY COUNTY, CALIFORNIA Final Report

K. S. Muir Sep. 1982 44 p refs Prepared in cooperation with the Monterey Peninsula Water Management District

(PB83-149229; USGS/WRD/WRI/82-075; USGS/WRI-82-10) Avail: NTIS HC A03/MF A01 CSCL 08H

The ground-water resource in the Seaside area, in central coastal Monterey County, is described and evaluated. The Santa Margrita Sandstone, Paso Robles Formation, Aromas Sand, and the older dunes, with an aggregate maximum thickness of more than 1,000 feet, constitute the ground-water reservoir. The Monterey Shale and granitic rocks form the bottom and southern boundaries of the reservoir. Recharge to the ground-water reservoir occurs as infiltration of rain, subsurface inflow from adjacent areas, and seepage from streams. Rain infiltration accounts for about 75 percent of the recharge. The ground-water yield of the total reservoir system is estimated to range from 6,400 to 7,700 acre-feet per year. Seawater intrusion poses the major threat of water-quality degradation. GRA

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N83-26251*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

AUTOIGNITION IN A PREMIXING-PREVAPORIZING FUEL DUCT USING 3 DIFFERENT FUEL INJECTION SYSTEMS AT INLET AIR TEMPERATURES TO 1250 K Final Report

Robert R. Tacina May 1983 15 p refs

(Contract DE-AI01-77CS-51040)

(NASA-TM-82938; E-1334; NAS 1.15:82938;

DOE/NASA/51040-45) Avail: NTIS HC A02/MF A01 CSCL 21B

Conditions were determined in a continuous-flow, premixing-prevaporizing duct at which autoignition occurred. Test conditions were representative of an advanced, regenerative-cycle, automotive gas turbine. The test conditions inlet air temperatures from 600 to 1250 K (a vitiated preheater was used), pressures from 170 to 600 kPa, air velocities of 10 to 30 m/sec, equivalence ratios from 0.3 to 1.0, mixing lengths from 10 to 60 cm, and residence times of 2 to 100 ms. The fuel was diesel number 2. The duct was insulated and had an inside diameter of 12 cm. Three different fuel injection systems were used: One was a single simplex pressure atomizer, and the other two were multiple-source injectors. The data obtained with the simplex and one of the multiple-source injectors agreed satisfactorily with the references and correlated with an Arrenhius expression. The data obtained with the other multiple source injector, which used multiple cones to improve the fuel-air distribution, did not correlate well with residence time. Author

N83-26252*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

NASA REDOX STORAGE SYSTEM DEVELOPMENT PROJECT Annual Report

Apr. 1983 45 p refs

(Contract DE-AI04-80AL-12726)

(NASA-TM-83087; E-1546; NAS 1.15:83087;

DOE/NASA/12726-19) Avail: NTIS HC A03/MF A05 CSCL 10C

The operating temperature was raised from 25 C to 65 C, which enhanced the kinetics of the chromium electrode charging reactions. The design of the auxiliary electrochemical cell, which is used to keep both reactants at the same state of charge, was modified, leading to better and more stable performance. Preliminary testing has shown that the four tank mode of operation improves energy efficiency as much as 5 percentage points over the conventional two tank mode. Another variation in operating mode, the use of mixed reactants, potentially offers several very attractive advantages. Preliminary reactant cost studies lend further weight to the feasibility of the mixed reactant concept. Electrode studies show that reproducibility of performance is very dependent on the pyrolysis temperature at which the carbon/graphite felt substrate is formed. Membrane development work continued to concentrate on cost reduction and the enhancement of resistivity and selectivity. Author

N83-26253*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

TEST RESULTS OF A TEN CELL BIPOLAR NICKEL-HYDROGEN BATTERY

Robert L. Cataldo 1983 11 p refs Presented at the 18th Intersoc. Energy Conversion Eng. Conf., Orlando, Fla., 21-26 Aug. 1983; sponsored by AIChE, IEEE, AIAA, ACS, ANS, ASME AND SAE

(NASA-TM-83384; E-1657; NAS 1.15:83384) Avail: NTIS HC A02/MF A01 CSCL 10C

A ten cell bipolar nickel hydrogen 6.5 ampere-hour battery demonstrated over 2000 low Earth orbit cycles at an 80 percent depth-of-discharge. Charge/discharge cyclic ampere-hour and watt-hour efficiencies of 88 and 76 percent, respectively, observed. Peak power capability was determined at 1.1 kW. A 10C discharge rate yields 83 percent of the nominal stark capacity to the 1.0 volt cut off in just under 6 minutes. Author

N83-26254*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Flat-Plate Solar Array Project.

DEVELOPMENT OF A LARGE LOW-COST DOUBLE-CHAMBER VACUUM LAMINATOR

D. R. Burger 15 Jan. 1983 32 p refs

(Contract DE-AI01-76ET-20356)

(NASA-CR-172652; JPL/DOE-1012-83; JPL-Publ-83-22;

JPL-5101-225; NAS 1.26:172652) Avail: NTIS HC A03/MF A01 CSCL 10A

A double-chamber vacuum laminator was required to investigate the processing and control of the fabrication of large terrestrial photovoltaic modules, and economic problems arising therefrom. Major design considerations were low cost, process flexibility and the exploration of novel equipment approaches. Spherical end caps for industrial tanks were used for the vacuum chambers. A stepping programmer and adjustable timers were used for process flexibility. New processing options were obtained by use of vacuum sensors. The upper vacuum chamber was provided with a diaphragm support to reduce diaphragm stress. A counterweight was used for handling ease and safety. Heat was supplied by a large electrical strip heater. Thermal isolation and mechanical support were provided inexpensively by a bed of industrial marbles. Operational testing disclosed the need for a differential vacuum gauge and proportional valve. Reprogramming of the process control system was simple and quick. Author

N83-26255*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE APPLICATION OF ENCAPSULATION MATERIAL STABILITY DATA TO PHOTOVOLTAIC MODULE LIFE ASSESSMENT
C. D. Coulbert 1 Apr. 1983 52 p refs
(Contract DE-A01-76ET-20356)
(NASA-CR-177653; DOE/JPL-1012-84; JPL-5101-224; JPL-Publ-83-27; NAS 1.26:177653) Avail: NTIS HC A04/MF A01 CSCL 10A

For any piece of hardware that degrades when subject to environmental and application stresses, the route or sequence that describes the degradation process may be summarized in terms of six key words: LOADS, RESPONSE, CHANGE, DAMAGE, FAILURE, and PENALTY. Applied to photovoltaic modules, these six factors form the core outline of an expanded failure analysis matrix for unifying and integrating relevant material degradation data and analyses. An important feature of this approach is the deliberate differentiation between factors such as CHANGE, DAMAGE, and FAILURE. The application of this outline to materials degradation research facilitates the distinction between quantifying material property changes and quantifying module damage or power loss with their economic consequences. The approach recommended for relating material stability data to photovoltaic module life is to use the degree of DAMAGE to (1) optical coupling, (2) encapsulant package integrity, (3) PV circuit integrity or (4) electrical isolation as the quantitative criterion for assessing module potential service life rather than simply using module power loss. B.W.

N83-26256*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ADVANCED COGENERATION RESEARCH STUDY. SURVEY OF COGENERATION POTENTIAL
Marie L. Slonski May 1983 59 p refs Sponsored by Southern California Edison Co.
(NASA-CR-172648; JPL-Publ-83-40; NAS 1.26:172648) Avail: NTIS HC A04/MF A01 CSCL 10B

Fifty-five facilities that consumed substantial amounts of electricity, natural gas, or fuel oil were surveyed by telephone in 1983. The primary objective of the survey was to estimate the potential electricity that could be generated in the SCE service territory using cogeneration technology. An estimated 3667 MW sub e could potentially be generated using cogenerated technology. Of this total, current technology could provide 2569 MW sub p and advanced technology could provide 1098 MW sub e. Approximately 1611 MW sub t was considered not feasible to produce electricity with either current or advanced cogeneration technology. Author

N83-26257# Los Alamos Scientific Lab., N. Mex. Solar Energy Group.
PASSIVE TEST CELL DATA FOR THE SOLAR LABORATORY WINTER, 1980-81
R. D. McFarland May 1982 83 p refs
(Contract W-7405-eng-36)
(LA-9300-MS) Avail: NTIS HC A05/MF A01

Testing was done primarily to determine the relative efficiency of various passive solar heating concepts and to obtain data that could be used to validate computer simulation programs. The passive solar systems tested were Trombe wall with and without selective absorber, water wall, phase change wall, direct gain, a heat pipe collector, and two sunspace geometries. The heating load coefficient of these cells was roughly 26 Btu/h deg F and the collector area was 23.4 sq ft, giving a load collector ratio of approximately 27 Btu/deg F day sq ft. The test cell configurations and instrumentation are detailed, and the resulting data and cell efficiencies are discussed. S.L.

N83-26258*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SOLAR ENERGY CONVERTER USING SURFACE PLASMA WAVES Patent Application
Lynn M. Anderson, inventor (to NASA) Filed 19 Apr. 1983 14 p (NASA-Case-LEW-13827-1; US-Patent-Appl-SN-486470) Avail: NTIS HC A02/MF A01 CSCL 10A

Sunlight is dispersed over a diffraction grating formed on the surface of a conducting film on a substrate. The angular dispersion controls the effective grating period so that a marching spectrum of surface plasmons is excited for parallel processing on the conducting film. The resulting surface plasmons carry energy to an array of inelastic tunnel diodes. This solar energy converter does not require different materials for each frequency band, and sunlight is directly converted to electricity in an efficient manner by extracting more energy from the more energetic photons. NASA

N83-26259*# Avco-Everett Research Lab., Mass.
PARAMETRIC STUDY OF POTENTIAL EARLY COMMERCIAL MHD POWER PLANTS. TASK 3: PARAMETER VARIATION OF PLANT SIZE Final Report
Finn A. Hals Sep. 1981 221 p refs
(Contracts DEN3-51; DE-AI01-77ET-710769)
(NASA-CR-165445; DOE/NASA/0051-3; NAS 1.26:165445) Avail: NTIS HC A10/MF A01 CSCL 10B

Plants with a nominal output of 200 and 500 MWe and conforming to the same design configuration as the Task II plant were investigated. This information is intended to permit an assessment of the competitiveness of first generation MHD/steam plants with conventional steam plants over the range of 200 to 1000 MWe. The results show that net plant efficiency of the MHD plant is significantly higher than a conventional steam plant of corresponding size. The cost of electricity is also less for the MHD plant over the entire plant size range. As expected, the cost differential is higher for the larger plant and decreases with plant size. Even at the 200 MWe capacity, however, the differential in COE between the MHD plant and the conventional plant is sufficient attractive to warrant serious consideration. Escalating fuel costs will enhance the competitive position of MHD plants because they can utilize the fuel more efficiently than conventional steam plants. S.L.

N83-26260# RAND Corp., Santa Monica, Calif.
RESIDENTIAL DEMAND FOR ENERGY: A REVIEW OF THE EMPIRICAL LITERATURE AND SOME NEW RESULTS
Sheila Nataraj Kirby Jan. 1983 59 p refs
(P-6847) Avail: NTIS HC A04/MF A01

Demand for energy is derived from the demand for particular end-use service (e.g., warmth, cooling, clothes drying, etc.). This derivative nature of energy demand gives rise to two major, although interrelated, issues: first, a complete model must consider both the demand for services and the demand for energy-using equipment; second, the essentially dynamic nature of the demand requires a clear delineation between short-run and long-run responses. Because of their durability, appliance stocks will be adjusted only over a period of time. In contrast, the intensity of utilization of a given appliance portfolio can be adjusted fairly rapidly. In the short run, defined as the period of time during which appliance stocks are fixed, households are essentially limited in their ability to respond to changes in fuel prices and income. In the long run, households may alter their stock of energy using equipment to reflect more accurately their desired capital stock. As such, longer run responses will be much larger in magnitude than short run responses. Author

N83-26261# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN INVESTIGATION INTO THE RELATIONSHIP OF FLUIDIZATION VELOCITY TO THE OPTIMAL ECONOMIC DESIGN OF A FLUIDIZED-BED DRYING PROCESS M.S. Thesis
Moussa Ibrahim M. Mostafa Dec. 1982 96 p refs
(AD-A124717; AFIT/GOR/OS/82D-10) Avail: NTIS HC A05/MF A01 CSCL 07/1

This thesis investigates the economic characteristics of a fluidized-bed drying process. It focuses on the way in which fluid velocity impacts the capital and power consumption costs of such a system. The engineering and economic relationships employed

in the model are developed and a sensitivity of the optimal design of a fluidized-bed drying process based on capital and operating cost is explored through variation in the technical parameters of the model. Author (GRA)

N83-26262# CTI-Cryogenics, Inc., Waltham, Mass. Dept. of Product Engineering.
HIGH PERFORMANCE SPLIT-STIRLING COOLER PROGRAM Final Technical Report, Sep. 1979 - Sep. 1982
Richard P. Meeker Sep. 1982 114 p
(Contract DAAK70-79-C-0152)
(AD-A123768; M8040111) Avail: NTIS HC A06/MF A01 CSCL 13/1

This report describes the physical characteristics of the final design configuration of the 1 Watt Split-Stirling Cryogenic Cooler. Qualification testing included evaluation of the 1.0 Watt Cryogenic Cooler under the following conditions: Performance tests over the temperature range of -40 degrees C to +55 degrees C; High and Low Temperature Shock Tests; Mechanical Shock Tests; Sinsoidal Vibration; Self-Induced Vibration; Acoustical Testing; and 1000-Hour Mean Time Between Failure Life Tests. The cryogenic cooler design consists of a motor and compressor assembly, and a remote expander assembly, interconnected by a stainless steel capillary line. The system is nominally a 18.5 VDC, 60 Watt cooler and has a maximum weight of 4 pounds. This report summarizes the results of the performance, environmental and life qualification tests conducted under the contract and provides supporting data for each of the test categories. Author (GRA)

N83-26263# Kling-Lindquist, Inc., Philadelphia, Pa.
ENERGY MONITORING AND CONTROL SYSTEMS-PERFORMANCE VERIFICATION AND ENDURANCE TEST PROCEDURES Final Report
Jeffery Cosiol and Francine Bomar Port Hueneme, Calif. NCEL Dec. 1982 188 p
(Contract N62474-81-C-9373)
(AD-A123821; NCEL-CR-83.003) Avail: NTIS HC A09/MF A01 CSCL 09/2

This report presents generic tests designed to assist in assuring that EMCS installed using the tri-service EMCS guide specifications meet the specified technical, operational, and performance requirements. GRA

N83-26264# EIC, Inc., Newton, Mass.
EXPLORATION OF THE FEASIBILITY OF PRESENT GENERATION LITHIUM BATTERIES FOR ELECTRIC VEHICLES
P. B. Harris, G. L. Holleck, J. Buzby, J. Avery, and L. Pitts Nov. 1982 54 p
(Contract N00014-77-C-0155)
(AD-A124098; C-480A; TR-9) Avail: NTIS HC A04/MF A01 CSCL 10/3

The technology of secondary Li batteries was investigated for feasibility for use in automotive propulsion systems. A computer modeling effort examined series vs. parallel plate arrangement in battery modules and critical factors limiting energy density in each case. It was found that the most critical factor is the cathode energy density, and that to achieve the ultimate goal of 125 Wh/lb a cathode energy density of 290 Wh/lb is necessary. The 20 Ah Li/LiAsF6 in 2Me-THF MoS3 cells were built and tested. Although MoS3 is theoretically capable of providing the necessary energy density to meet the ultimate goal, it requires more development to overcome chemical instability in the system. GRA

N83-26265# Army Electronics Research and Development Command, Fort Monmouth, N. J. Electronics Technology/Devices Lab.
EVALUATION OF LITHIUM-VANADIUM OXIDE CELLS
Herbert F. Hunger Dec. 1982 21 p refs
(DA Proj. 1L1-61102-AH-47)
(AD-A123720; DELET-TR-82-10) Avail: NTIS HC A02/MF A01 CSCL 07/4

Hermetically sealed lithium-vanadium oxide cells were evaluated after one year of storage. From cell capacity measurements, excellent charge retention was found. The energy to weight and volume ratios did not change substantially during storage. The rate capability observed is within practical limits. At 0 degrees C the rate is 31 percent of that at room temperature. Author (GRA)

N83-26266# EIC, Inc., Newton, Mass.
AMBIENT TEMPERATURE RECHARGEABLE LITHIUM CELLS: STATE OF THE ART; PROBLEMS AND OPPORTUNITIES
S. B. Brummer Dec. 1982 34 p refs Submitted for publication
(Contract N00014-77-C-0155; NR Proj. 359-638)
(AD-A124052; TR-10) Avail: NTIS HC A03/MF A01 CSCL 10/3

The state of the art in rechargeable lithium cells is reviewed. Striking advances were made in the 1970's. Systems based on Li/2Methyl tetrahydrofuran, LiAsF6/TiS2 are the most advanced. They show greater than 200 cycles in small (less than 1 Ah) cells and approx. 100 cycles in larger (approx. 5-20 Ah) cells. Limiting problems and future directions for research and development are discussed. GRA

N83-26267# Daimler-Benz A. G., Stuttgart (West Germany).
STATIONARY HYDRIDE STORAGE SYSTEMS AS EQUALIZING SYSTEMS FOR ELECTRICAL PEAK LOADS Final Report
H. Buchner, E. Schmidt-Ihn, E. Kliem, U. Lang, and U. Scheer 1982 142 p refs Transl. into ENGLISH of the mono. "Stationare Hydridspeicher als Ausgleichsspeicher Elektrischer Spitzenenergien" West Germany, 1981 168 p
(PB83-149666) Avail: NTIS HC A07/MF A01 CSCL 10C

The storage of electric peak energy by means of hydrogen has been investigated from a technical and economic point of view for a stationary hydride storage system with a capacity of 100-1,000 MWh (32,000-320,000 cu m H2). Titanium, chromium, and manganese-based low-temperature hydrides which store 2 percent of hydrogen were chosen and their thermodynamic and kinetic properties as well as their thermal conductivity were examined. The low thermal conductivity of the material is improved by the admixture of metal powder. An operational cycle of 8 hours each of absorption, storage and deep desorption was assumed, heat flow being the rate limiting factor. Two variants (steels or concrete outer jacket) are described. Depending on its size, the hydride storage system consists of 2 to 20 storge units with a H-2 capacity of 16000 cu m each. Author (GRA)

N83-26268# Argonne National Lab., Ill.
ENERGY STORAGE CRITERIA HANDBOOK Final Report, Mar. 1981 - Jun. 1982
John R. Hull, Roger L. Cole, and Amy B. Hull Oct. 1982 485 p refs
(Contract N68305-81-MP-10027)
(AD-A125180; NCEL-CR-82.034) Avail: NTIS HC A21/MF A01 CSCL 10/3

The purpose of this handbook is to provide information and criteria necessary for the selection and sizing of energy storage technologies for use at U.S. Naval facilities. The handbook gives Naval base personnel procedures and information to select the most viable energy storage options to provide the space conditioning (heating and cooling) and domestic hot water needs of their facility. The handbook may also be used by contractors, installers, designers, engineers, architects, and manufacturers who intend to enter the energy storage business. The handbook is organized into three major sections: a general section, a technical section, and an example section. While a technical background is assumed for the latter two sections, the general section is simply written and can serve as an introduction to the field of energy storage. The technical section examines the following energy storage technologies: sensible heat storage, latent heat storage, cold storage, thermochemical storage, mechanical storage, pumped hydro storage, and electrochemical storage. The example section is limited to thermal storage and includes examples for: water tank storage, rockbed storage, latent heat storage, and cold water storage. GRA

N83-26269# Battelle Columbus Labs., Ohio.
DESIGN AND MARKET STUDY OF RETROFIT PHOTOVOLTAIC SYSTEMS FOR COMMERCIAL BUILDINGS AND APPLICATIONS. VOLUME 1: EXECUTIVE SUMMARY
G. T. Noel, J. R. Hagely, J. H. Broehl, L. H. Stember, J. L. Ruckman, and W. R. Huss Mar. 1982 116 p Prepared for Sandia Labs., Livermore, Calif.
(Contract DE-AC04-76DP-00789)
(DE82-019804; SAND-81-7179/1) Avail: NTIS HC A06/MF A01

A study was performed of the potential market for retrofit photovoltaic systems in commercial, institutional, and industrial applications. It includes assessments of the inventory of potential applications and of PV systems related characteristics of buildings. Detailed PV systems designs appropriate for 12 highly ranked retrofit applications are presented along with estimated costs. Retrofit construction and installation techniques are illustrated and the results of life-cycle costing and market penetration analyses are discussed. DOE

N83-26270# Boeing Commercial Airplane Co., Seattle, Wash.
INTERMEDIATE PHOTOVOLTAIC SYSTEM APPLICATION EXPERIMENT OPERATIONAL PERFORMANCE. VOLUME 8: LOVINGTON SQUARE SHOPPING CENTER, LOVINGTON, NEW MEXICO Executive Summary
Mar. 1982 8 p refs
(Contract DE-AC04-76DP-00789)
(DE82-014248; SAND-81-7099/8) Avail: NTIS HC A02/MF A01

For the month of February 1982, performance data are summarized for a 100 kW-peak, flat panel, grid-connected photovoltaic power supply at a New Mexico shopping center. Data given include daily and monthly energy produced, daily and monthly insolation, array efficiency, power conditioner efficiency, photovoltaic system efficiency, and capacity factor. Also given is a data acquisition mode and recording interval plot that gives for each day the daylight hours with the system on and with it off, nighttime hours, and those hours for which no data were acquired. DOE

N83-26271# Boeing Computer Services, Inc., Seattle, Wash.
INTERMIDIATE PHOTOVOLTAIC SYSTEM APPLICATION EXPERIMENT OPERATIONAL PERFORMANCE REPORT FOR MISSISSIPPI COUNTY COMMUNITY COLLEGE, BLYTHEVILLE, ARKANSAS
Jul. 1982 28 p refs Prepared for Sandia Labs., Livermore, Calif.
(Contract DE-AC04-76DP-00789)
(DE82-019877; SAND-81-7091/1) Avail: NTIS HC A03/MF A01

The data accumulated during March 1982 at the photovoltaic project site at the Mississippi County Community College, Blytheville, Arkansas is presented. Generated power and environmental (weather) data are presented graphically. Explanations of irregularities not attributable to weather are provided. DOE

N83-26272# Boeing Computer Services, Inc., Seattle, Wash.
INTERMEDIATE PHOTOVOLTAIC SYSTEM APPLICATION EXPERIMENT OPERATIONAL PERFORMANCE REPORT. VOLUME 8: NEWMAN POWER STATION, EL PASO, TEXAS
Feb. 1982 25 p refs Prepared for Sandia Labs., Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE82-012059; SAND-81-7086/8) Avail: NTIS HC A02/MF A01

For the month of January, 1982, performance data are given for a photovoltaic power supply used by a Texas electric utility. Data presented include: daily and monthly electrical energy produced; daily and monthly solar energy incident on the array; daily and monthly array efficiency; plots of energy produced as a function of power levels, voltage, cell temperature, and hour of day; electrical energy supplied by the photovoltaic system to the load and the corresponding dollar value; photovoltaic system efficiency; capacity factor; daily photovoltaic power supplied to the load; daily system availability; hourly and monthly insolation; hourly and monthly ambient temperature; hourly and monthly average wind speed; wind direction distribution; number of freeze/thaw cycles; heating and cooling degree days; hourly cell temperature; daily data acquisition mode and recording interval plot. Also included are brief summaries of problems, operations and maintenance events. DOE

N83-26273# Boeing Computer Services, Inc., Seattle, Wash.
INTERMEDIATE PHOTOVOLTAIC SYSTEM APPLICATION EXPERIMENT OPERATIONAL PERFORMANCE REPORT. VOLUME 9: LOVINGTON SQUARE SHOPPING CENTER, LOVINGTON, NEW MEXICO
Mar. 1982 27 p refs Prepared for Sandia Labs., Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE82-018345; SAND-81-7085/9) Avail: NTIS HC A03/MF A01

Performance data are presented for a photovoltaic power supply at a New Mexico shopping center for the month of February 1982. Data given include: daily and monthly electrical energy produced; daily and monthly incident solar energy; daily and monthly array efficiency; energy production as a function of power level, voltage, cell temperature, and hour of the day; power conditioner input, output, and efficiency for two individual units and for the total system; system efficiency for the month; daily and monthly photovoltaic energy to the load; dollar value of the photovoltaic energy for the month; capacity factor; daily availability; daily and hourly insolation; monthly and hourly ambient temperature; heating and cooling degree days; number of freeze/thaw cycles; hourly and monthly wind speed; wind direction distribution; and the data acquisition mode and recording interval plot. Also included are summaries of 5 site events. DOE

N83-26274# AIA Research Corp., Washington, D. C.
RESIDENTIAL, DESIGN SENSITIVITY ANALYSIS
G. C. Royal, III Mar. 1982 74 p refs Prepared for Sandia Labs., Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE82-013531; SAND-81-7045) Avail: NTIS HC A04/MF A01

The effect passive solar heating strategies has on residential photovoltaic (PV) system performance in 1986 was identified. In addition, previous design and analysis studies conducted by General Electric and Westinghouse were evaluated to determine whether passive heating would significantly alter their results. Passive heating contributions were found to reduce interaction of the PV system with the load. However, the differences in displaced utility electricity between small and large passive contributions are small. These results show the relative insensitivity of PV system performance to large amounts of passive solar heating. Once daytime heating is achieved through suntempering, any further passive contribution has minimal effect on daytime electrical heating loads. Incorporation of passive heating systems in a residence does not affect the definition of optimum PV system size. Author

N83-26275# General Electric Co., Philadelphia, Pa. Energy Systems and Technology Div.
DESIGN OF A PHOTOVOLTAIC SYSTEM FOR A TEMPERATE CLIMATE ALL-ELECTRIC RESIDENCE
E. M. Mehalik, G. F. Tully, J. Johnson, N. Truncellito, and R. Schaeffer Jan. 1982 164 p refs Prepared for Sandia Labs., Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE82-008207; SAND-80-7173) Avail: NTIS HC A08/MF A01

A photovoltaic system was developed and integrated into a single story residence having low space conditioning loads typical of a temperate climate similar to Santa Maria, CA. The design addresses the residential market segment of low energy consuming houses with limited roof area availability; in fact the garage roof is used for the array. The array size to meet the requirements of this type of house covers 40 square m with a rated power output of 4.3 kW at NOCT conditions. A flexible array installation is presented which can be implemented as an integral mount or a stand-off mount depending on the homeowner preference. A 4 kW utility-tied inverter is used in the power conversion subsystem, representative of currently available hardware. The system provides feedback of excess energy to the utility which is the

most promising approach for grid-connected residential systems in the mid 1980's. DOE

N83-26276# Oak Ridge National Lab., Tenn.
RESULTS OF THE HARMONICS MEASUREMENT PROGRAM AT THE JOHN F. LONG PHOTOVOLTAIC HOUSE
G. L. Campen Mar. 1982 125 p refs
(Contract W-7405-eng-26)
(DE82-008893; ORNL-5834) Avail: NTIS HC A06/MF A01

Photovoltaic (PV) systems used in single-family dwellings require an inverter to act as an interface between the direct-current (dc) power output of the PV unit and the alternating-current (ac) power needed by house loads. A type of inverter known as line commutated injects harmonic currents on the ac side and requires large amounts of reactive power. Large numbers of such PV installations could lead to unacceptable levels of harmonic voltages on the utility system, and the need to increase the utility's deliver of reactive power could result in significant cost increases. The harmonics and power-factor effects are examined for a single PV installation using a line-commutated inverter. The magnitude and phase of various currents and voltages from the fundamental to the 13th harmonic were recorded both with and without the operation of the PV system. DOE

N83-26277# Lincoln Lab., Mass. Inst. of Tech., Lexington.
DATA REPORT FOR THE NORTHEAST RESIDENTIAL EXPERIMENT STATION, JANUARY 1982
M. C. Russell, P. Raghuraman, and P. C. Mahoney Jun. 1982 21 p refs
(Contract DE-AC02-76ET-20279)
(DE82-017241; DOE/ET-20279/204) Avail: NTIS HC A02/MF A01

Physical performance data obtained from photovoltaic energy systems under test at the Northeast Residential Experiment Station(NE RES) in Concord, Massachusetts are tabulated. Five prototype residential photovoltaic systems are under test at the NE RES. Each consists of a roof mounted PV array sized to meet at least 50% of the annual electrical demand of an energy conserving house and an enclosed structure to house the remainder of the PV equipment, test instrumentation and work space. The arrays provide DC power which is converted to AC by power conditioning equipment to service all the usual loads of a residence. Each prototype system is grid connected. Another house in Carlisle, Massachusetts provided with a PV system is also being monitored. The computational basis for the data reported is given. A monthly summary tabulates the monthly performance of the PV systems and monitored houses as well as meteorological data. DOE

N83-26278# Ford Aerospace and Communications Corp., Palo Alto, Calif.
SECOND-GENERATION PHOTOVOLTAIC TWO-AXIS TRACKING STRUCTURE DEVELOPMENT PROGRAM
Feb. 1982 290 p refs
(Contract DE-AC04-76DP-00789)
(DE82-012061; SAND-81-7184) Avail: NTIS HC A13/MF A01

Design of a two axis turntable tracking structure supporting 336 photovoltaic concentrator modules producing 35 kW was completed. The tracking structure rotates about a central pintle supported by 20 post-mounted wheels to follow the Sun in azimuth. A simple actuator tilts modules supported on 7 rows of torque tubes to follow the Sun in elevation. Design optimization trade studies are summarized and truss structure and foundations. Complete design drawings are also included. DOE

N83-26279# Clemson Univ., S.C. Dept. of Electrical and Computer Engineering.
INVESTIGATION OF LOAD-MANAGEMENT STRATEGIES FOR RESIDENTIAL PHOTOVOLTAIC SYSTEMS
J. W. Lathrop and J. F. Rudisill Mar. 1982 110 p refs
(Contract DE-AC04-76DP-00789)
(DE82-014434; SAND-82-7104) Avail: NTIS HC A06/MF A01

Described is the development of a computer model which simulates individual residential demand on an instantaneous basis. When combined with a supply model incorporating the utility interface and the option of battery storage the advantage of various load management strategies may be investigated in terms of system life cycle cost. Sample runs for Boston and Albuquerque illustrate use of the evaluation technique. Although the load management strategies investigated did not appear particularly cost effective, it was shown that the commonly accepted approach of using hourly demand averages leads to an overly optimistic view of photovoltaic economics. DOE

N83-26280# BDM Corp., Albuquerque, N. Mex.
EL PASO ELECTRIC PHOTOVOLTAIC-SYSTEM ANALYSES
May 1982 121 p refs
(Contract DE-AC04-76DP-00789)
(DE82-017000; BDM/A-81-656-TR; SAND-82-7101) Avail: NTIS HC A06/MF A01

Four analyses were performed on the Newman Power Station PV system. Two were performed using the Photovoltaic Transient Analysis Program and two with the SOLCEL II code. The first was to determine the optimum tilt angle for the array and the sensitivity of the annual energy production to variation in tilt angle. The optimum tilt angle was found to be 28 deg, and variations of 2 deg produce losses of only 0.06% in the annual energy production. The second analysis assesses the power loss due to cell to cell variations in short circuit current and the degree of improvement attainable by sorting cells and matching modules. Typical distributions on short circuit current can cause losses of about 9.5 to 11 percent in peak array power, and sorting cells into 4 bins prior to module assembly can reduce the losses to about 6 to 8 percent. Using modules from the same cell bins in building series strings can reduce the losses to about 4.5 to 6 percent. DOE

N83-26281# Sandia Labs., Albuquerque, N. Mex.
INTERMEDIATE PHOTOVOLTAIC SYSTEM APPLICATION EXPERIMENT OPERATIONAL PERFORMANCE REPORT. VOLUME 7: NEWMAN POWER STATION, EL PASO, TEXAS
Jan. 1982 22 p refs
(Contract DE-AC04-76DP-00789)
(DE82-008621; SAND-81-70867-Vol-7) Avail: NTIS HC A02/MF A01

Performance data are given for the month of December, 1981 for a photovoltaic power supply at a Texas power station. Data include: monthly and daily electric energy produced; monthly and daily solar energy received; monthly and daily array efficiency; plots of energy produced as a function of power level, voltage, cell temperature, and hour of the day; monthly and daily electrical energy supplied by the photovoltaic system to the load; daily system availability; monthly and hourly insolation; monthly and hourly ambient temperature; monthly and hourly wind speed; wind direction distribution; heating and cooling degree days; number of freeze/thaw cycles; hourly cell temperature; and a plot of daily data acquisition mode and recording interval. Also included are brief summaries of three site events. DOE

N83-26282# Sandia Labs., Albuquerque, N. Mex.
PROCEEDING OF THE DOE SOLAR THERMAL TECHNOLOGY PROGRAM PLANNING WORKSHOP
L. G. Radosevich, ed. Mar. 1982 58 p refs Workshop held at Gettysburg, Pa., 3 Nov. 1981
(Contract DE-AC04-76DP-00789)
(DE82-012237; SAND-82-8214; CONF-811193-Summ) Avail: NTIS HC A04/MF A01

The workshop reviewed several strategies for solar thermal technology program planning. After the strategy options were presented to the workshop participants, each committee (user/supplier, system test and evaluation, technology development, and research) was asked to address the following issues: which strategy shows the best potential for meeting the objectives of the solar thermal program; is there an obvious imbalance in the program in terms of emphasis in various areas; are there any activities which should be added or deleted; and, if a funding cut occurs, how should the cut be made. The strategy options are briefly dis-

cussed. Summary reports from each committee follow, and a compilation of the committee findings highlights major similarities and differences. DOE

N83-26283# Sandia Labs., Albuquerque, N. Mex.
CENTRAL-RECEIVER INFRARED TEMPERATURE-MEASUREMENT EXPERIMENT
J. C. Gibson Apr. 1982 42 p refs
(Contract DE-AC04-76DP-00789)
(DE82-013816; SAND-81-8022) Avail: NTIS HC A03/MF A01

Instrumenting a central receiver to obtain front surface temperature measurements was difficult. A system was investigated that is potentially capable of measuring receiver temperatures by optically monitoring radiated ir energy. Comparison of the experimental data with the temperature data obtained from receiver mounted thermocouples indicates satisfactory experimental results; however, the absolute accuracy of these results was not determined. DOE

N83-26284# Sandia Labs., Albuquerque, N. Mex.
THE 10-MW/SUB e/ SOLAR-THERMAL CENTRAL-RECEIVER PILOT PLANT: OPERATIONAL TEST REQUIREMENTS
J. J. Bartel and C. W. Moore May 1982 103 p refs
(Contract DE-AC04-76DP-00789)
(DE82-015869; SAND-79-8037) Avail: NTIS HC A05/MF A01

The operational test requirements are defined for the 10 MW/sub e/ Central Receiver Pilot Plant near Barstow, California. Top level requirements are presented from which specific tests will be developed, and information is provided on the objectives, test schedule, types and duration of tests, instrumentation and data acquisition requirements, and data reduction and analysis requirements for the operational tests. DOE

N83-26285# Black and Veatch Consulting Engineers, Kansas City, Mo.
DESIGN AND FABRICATION OF AN 1-MW(th) CERAMIC TUBE BENCH-MODEL SOLAR RECEIVER Summary Report
E. L. Cox May 1982 53 p refs Sponsored by Electric Power Research Inst.
(EPRI Proj. 475-2)
(DE82-905784; EPRI-AP-2398-54) Avail: NTIS HC A04/MF A01

The design and fabrication of an 1MWt Bench Model Solar Receiver (BMSR) demonstrated and developed the ceramic tube central receiver concept. Although many of the properties of silicon carbide are well documented, this material was never utilized in an application of this type and size. Further investigation was undertaken to confirm the choice of silicon carbide against available metals and other ceramic materials. DOE

N83-26286# Bechtel Corp., San Francisco, Calif.
ADVANCED CONCEPTUAL DESIGN FOR SOLAR REPOWERING AT PIONEER MILL CO., LTD. Final Report
May 1982 435 p refs
(Contract DE-AC03-81SF-11567)
(DE82-017681; DOE/SF-11567/1) Avail: NTIS HC A19/MF A01

An advanced conceptual design for a solar repowering facility has been prepared for a Hawaii sugar factory. A baseline conceptual design is summarized as a starting point and the tradeoff studies that were performed are described. The results of a review of the available relevant data covering both solar component development And site-specific parameters, and the tradeoff studies conducted during the refinements of the baseline conceptual design into the advanced conceptual design are described. The systems of the advanced conceptual design of the solar repowering facility are described in detail, including the collector system, the receiver system, the thermal transport system, the master system, and the nonsolar energy system. The description of each system includes details of the major components and their locations, functional requirements, design and operating characteristics, performance estimates, and cost estimates. DOE

N83-26287# Oak Ridge National Lab., Tenn. Chemical Technology Div.
SUMMARY OF BIOMASS RESEARCH PROGRAMS AT OAK RIDGE NATIONAL LABORATORY
R. K. Genung, R. I. VanHook, and D. J. Bjornstad 1982 4 p Presented at the TVA Southeast Region Biomass Res. Conf., Muscle Shoals, Ala., 12-13 Jul. 1982
(DE82-018169; CONF-820730-1) Avail: NTIS HC A02/MF A01

Biomass activities are described in relation to production and conversion. Economic and market analyses of biomass usage are presented. DOE

N83-26288# Martin Marietta Aerospace, Denver, Colo.
THE 2.2-KILOWATT PHOTOVOLTAIC CONCENTRATOR ARRAY
Jan. 1982 100 p
(Contract DE-AC04-76DP-00789)
(DE82-012062; SAND-81-7009) Avail: NTIS HC A05/MF A01

Martin Marietta's design, fabrication and installation of an active cooling system for their 2.2 kW pedestal mounted Fresnel lens photovoltaic array is described. The previous design used a finned extruded aluminum passive heat exchanger to keep the solar cells cool. The actively cooled rectangular extruded aluminum channel through which coolant flows and cools the cells. The channel is attached at its center to the tracking structure and it supports two 1 ft. by 4 ft. modules (as with the passive design). The channels for side-by-side module pairs are connected by cast headers and flexible hoses. Coolant flows from module pair to module pair in a serpentine path through the array. DOE

N83-26289# California Univ., Livermore. Lawrence Livermore Lab.
ELECTRON ENERGY DISTRIBUTIONS, VIBRATIONAL POPULATION DISTRIBUTIONS AND NEGATIVE-ION CONCENTRATIONS IN HYDROGEN DISCHARGES
J. R. Hiskes and A. M. Karo 28 Jun. 1982 31 p refs Presented at the NATO Advan. Study Inst. on Atomic and Mol. Processes in Controlled Thermonucl. Res., Palermo, Italy, 19-30 Jul. 1982
(Contract W-7405-eng-48)
(DE82-019313; UCRL-87779; CONF-820731-1) Avail: NTIS HC A03/MF A01

The negative ion concentrations in hydrogen discharges caused by electron excitation and dissociative attachment processes are considered. The principal formation and destruction processes are discussed for electron densities in the range 10 to the 8th power to 10 to the 13th power electrons cu cm. Expressions are developed for calculating the high energy portion of the electron energy distribution in the discharge; using these energy distributions the electron excitation rates are evaluated. At low densities, the vibrational distribution arises from singlet electronic excitations and triplet excitations through the pi(3)/sub u/ state, in equilibrium with wall deexcitation processes. At high densities singlet excitations predominate in equilibrium with atom molecule deexcitation processes. Possibilities for negative ion generation in a two chamber tandem system are discussed in which the vibrational excitation occurs in a high power, high electron temperature discharge, kT/sub e/ = 5 eV, and dissociative attachment occurs in a low temperature kT/sub e/ = 1 eV, plasma chamber. DOE

N83-26290# Mining and Reclamation Council of America, Washington, D.C.
DETERMINING THE RESEARCH NEEDS OF THE SURFACE-COAL-MINING INDUSTRY Final Report
Lauri M. Zell Jul. 1982 146 p refs
(Contract DE-FG01-81FE-00094)
(DE82-019991; DOE/FE-00094/T1) Avail: NTIS HC A07/MF A01

Future increases in coal production and utilization will be largely dependent upon the development of new technologies that allow coal to be mined and utilized in an environmentally sound manner. Complexities and impacts of the new surface-mining regulations have created additional concern for both the development of new mining and reclamation procedures and for the implementation of such research efforts in the field. The Department of Energy's Office of Coal Mining and the Mining and Reclamation Council of

America (MARC) are committed to the identification and resolution of technical problems facing the surface-coal-mining industry. Recognizing the difficulty of assimilating, summarizing and disseminating technological advances to the coal industry, MARC conducted a nationwide study to bring together the diverse elements of the industry to develop a comprehensive list of practical and theoretical research needs which would help to mitigate these deficiencies. DOE

N83-26291# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst., Golden, Colo.
THERMOCHEMICAL ENERGY STORAGE AND TRANSPORT
R. Gerald Nix Aug. 1982 6 p refs Presented at the Energy Storage Contractors Review Meeting, Arlington, Va., 23-27 Aug. 1982
(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)
(DE82-020069; SERI/TP-234-1681; CONF-820827-3) Avail: NTIS HC A02/MF A01

Thermochemical energy storage and transport (TEST) were studied. Cases studied include a large central receiver heat utility and a small industrial process heat application with distributed parabolic dish solar collectors. The TEST does not appear to be generally cost effective; however, there are special cases of cost effectiveness. It is recommended that research on thermochemical processes emphasize the manufacture of renewable fuels using solar energy and the search for more cost effective TEST systems. DOE

N83-26292# Sandia Labs., Albuquerque, N. Mex. Experimental Systems Operation Div.
MIDTEMPERATURE SOLAR SYSTEMS TEST FACILITY PREDICTIONS FOR THERMAL PERFORMANCE BASED ON TEST DATA OF LOW- TO MEDIUM-TEMPERATURE LINE-FOCUSING SOLAR COLLECTORS. SUNPOWER SYSTEMS SOLAR COLLECTORS
Thomas D. Harrison Feb. 1982 54 p ref
(Contract DE-AC04-76DP-00789)
(DE82-012609; SAND-82-0092/3) Avail: NTIS HC A03/MF A01

Thermal performance predictions based on test data are presented for the Sunpower Systems solar collector for three output temperatures at eight cities in the United States. DOE

N83-26293# Sandia Labs., Albuquerque, N. Mex. Experimental Systems Operations Div.
MIDTEMPERATURE SOLAR SYSTEMS TEST FACILITY PREDICTIONS FOR THERMAL PERFORMANCE BASED ON TEST DATA OF LOW- TO MEDIUM-TEMPERATURE LINE-FOCUSING SOLAR COLLECTORS. WHITELINE MODEL W-11A COLLECTOR
Thomas D. Harrison Feb. 1982 23 p ref
(Contract DE-AC04-76DP-00789)
(DE82-012057; SAND-82-0092/4) Avail: NTIS HC A02/MF A01

Thermal performance predictions based on test data are presented for the Whiteline Model W-11A solar collector for three output temperatures at eight cities in the United States. DOE

N83-26294# Oak Ridge National Lab., Tenn. Engineering Technology Div.
ALKALI-METAL RANKINE TOPPING-CYCLE SYSTEM DESIGN AND DEVELOPMENT
R. S. Holcomb 1982 20 p refs Presented at the 17th Intersoc. Energy Conversion Eng. Conf., Los Angeles, 8-13 Aug. 1982
(Contract W-7405-eng-26)
(DE82-020820; CONF-820814-24) Avail: NTIS HC A02/MF A01

The alkali metal vapor topping cycle with a steam cycle which offers the potential of achieving a higher cycle efficiency than the steam cycle alone was examined. Design and development work was done on the alkali metal vapor Rankine cycle over the past several years. This effort was directed toward power systems for the two applications: nuclear auxiliary power systems for space vehicles and central station electric generating plants. A potassium Rankine cycle nuclear space power system was designed. Designs were studied for central station electric power plants of 200 to 600 MW(e) output for potassium and cesium vapor topping cycles with both natural gas and fluidized bed coal firing. A full-scale potassium boiler tube bundle module of the gas fired plant design was tested at 1540 F with gas firing. The alkali metal vapor power system designs are described and the results of the testing and status of the technology are presented. Author

N83-26295# Hammesfahr-Winter and Associates, Inc., Bernardsville, N.J.
PROGRAM FOR LARGE-SCALE UNDERGROUND-COAL-GASIFICATION TESTS
F. W. Hammesfahr and P. L. Winter Nov. 1982 165 p refs
(Contract DE-AC20-81LC-10703)
(DE83-004525; DOE/LC-10703/T1) Avail: NTIS HC A08/MF A01

The continuing development of underground coal gasification technology requires extended multi-module field programs in which the output gas is linked to surface usage. An effort was to apraise whether existing surface facilities in the utility, petroleum refinery, or natural gas industries could be used to reduce the cost of such an extended multi-module test and whether regional demand in areas having underground coal gasification coal resources could support the manufacture of transportation fuels from underground coal gasification gases. To limit the effort to a reasonable level but yet to permit a fair test of the concept, effort was focused on five states, Illinois, New Mexico, Texas, Washington, and Wyoming, which have good underground coal gasification reserves. Studies of plant distribution located 25 potential sites within 3 miles of the underground coal gasification amenable reserves in the five states. Distribution was 44% to utilities, 44% to refineries, and 12% to gas processing facilities. GRA

N83-26296# United Technologies Corp., East Hartford, Conn.
EVALUATION OF INDUSTRIAL ADVANCED HEAT-RECOVERY/THERMAL-ENERGY-STORAGE SYSTEMS, VOLUME 2 Final Report
H. R. McChesney, R. W. Bass, A. M. Landerman, T. N. Obee, and C. T. Sgamboti Dec. 1982 438 p refs Sponsored by EPRI (EPRI Proj. 1275-1)
(DE83-901132; EPRI-EM-2573-Vol-2) Avail: NTIS HC A19/MF A01

The recovery of waste heat from industrial processes offers significant opportunity for energy conservation provided the available energy source can be matched with a compatible energy consuming sink or end-use process. This investigation involved: examining plant and process energy data acquired during on-site visits to 12 industrial plants from which 24 candidate applications were identified where thermal energy storage would be necessary either to make possible or to enhance the recovery and reuse of industrial waste energy; compiling cost and performance data for commercially available equipment to recover, store and transfer waste heat between source and sink processes on demand; and assessing the economic benefits, possible energy savings and utility impact if proposed systems were installed and operated in industrial plants. Detailed industrial process data, pertinent equipment technical and cost information, proposed plant advanced heat recovery/thermal energy storage system designs, and a complete discussion of the procedures used and the results obtained are presented. DOE

N83-26297# Mueller Associates, Inc., Baltimore, Md.
PHOTOVOLTAICS: STATE-OF-KNOWLEDGE SURVEY OF ENVIRONMENTAL, HEALTH AND SAFETY ASPECTS
Jun. 1982 103 p refs Prepared in cooperated with JPL
(Contract DE-AC01-81EV-10450)
(DE83-005068; DOE/EV-10450/T2) Avail: NTIS HC A06/MF A01

The environmental, health and safety issues are addressed that have been identified for various photovoltaic technologies/materials, and the results of recent research into specific areas of concern are summarized. A distinction is made between those concerns common to all PV technologies and those specific to a single technology or application. The photovoltaic-energy-system life cycle is conveniently described in terms of four stages: raw-material collection and refining; component manufacture;

system installation and operation; and decommissioning and disposal. Research to date has addressed selected issues in each stage of the system life cycle. These include the acquisition and/or application of toxic materials required in certain cell technologies, specific manufacturing processes or process scales, and the environmental effects of large, centralized systems. DOE

N83-26298# Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE PHOTOVOLTAIC-ARRAY/POWER-CONDITIONING INTERFACE
H. M. Branz, G. W. Hart, and C. H. Cox, III Oct. 1982 136 p refs
(Contract DE-AC02-76ET-20279)
(DE83-004946; DOE/ET-20279/170) Avail: NTIS HC A07/MF A01

Two years' of effort to improve terrestrial flat-plate photovoltaic (PV) system efficiency through increased understanding of the array/power conditioner interface is reported. The flat-plate PV array is a highly variable source of dc electrical energy due to changing insolation and other factors. Computer simulation based on statistically typical weather data is used to analyze the terrestrial flat-plate PV source and to define the optimal characteristics of its interface with the power-conditioning subsystem. It is found that less than 5% of the annual available energy will be lost by operating most PV systems at a fixed voltage and that even after array degradation, maximum-power-point tracking usually will not present a significantly larger advantage over fixed-voltage operation. Experiments show that open-loop tracking using a new pilot-cell concept is also a viable array-operating strategy. Finally, power conditioner sizing is examined and techniques are developed for estimating the annual operating efficiency and the maximum dc voltage requirement of a power conditioner. DOE

N83-26299# General Electric Co., Philadelphia, Pa. Advanced Energy Programs Dept.
INITIAL DETAILED DESIGNS FOR INTERMEDIATE PHOTOVOLTAIC SYSTEMS: BOTTLING PLANT
J. Herz and G. OBrien Aug. 1982 287 p refs
(Contract DE-AC04-76DP-000789)
(DE83-004476; SAND-81-7187) Avail: NTIS HC A13/MF A01

The detailed design of a 155 kW roof mounted PV-thermal concentrating array system is described and is analyzed for performance and economics. The building architectural features and load demands of the bottling plant are defined, and photovoltaic array, electrical system design, and system installation are defined and discussed. Alternative mechanical design choices are also presented. Appended are a drawing set list, specifications, and installation details. DOE

N83-26300# Sargent and Lundy, Engineers, Chicago, Ill.
COMPRESSED-AIR ENERGY STORAGE PRELIMINARY DESIGN AND SITE-DEVELOPMENT PROGRAM IN AN AQUIFER. VOLUME 4: AQUIFER GEOLOGY Final Report
W. C. Walke and T. W. McCafferty Nov. 1982 195 p refs Sponsored by EPRI Prepared in cooperation with Public Service Co. of Indiana, Inc.
(Contracts DE-AC02-78ET-29232; ET-78-C-01-2159; EPRI Proj. 1081-3)
(DE83-004003; EPRI-EM-2351-Vol-4) Avail: NTIS HC A09/MF A01

A study sponsored by DOE and EPRI was performed to investigate the behavior and suitability of aquifers as compressed-air energy storage sites. The suitability of air storage in an aquifer, the geological structure of the study area, a literature review of potential areas of concern that could affect operation of a compressed-air energy storage plant, aquifer testing, media site geological conditions, and areas of potential risk from air storage in an aquifer are discussed. The effects of air storage in an aquifer are discussed. DOE

N83-26301# Los Alamos Scientific Lab., N. Mex.
PASSIVE SOLAR DESIGN HANDBOOK. VOLUME 3: PASSIVE SOLAR DESIGN ANALYSIS
Robert W. Jones, ed., J. Douglas Bascomb, Claudia E. Kosiewicz, Gloria S. Lazarus, Robert D. McFarland, and William O. Wray Jul. 1982 677 p refs
(DE83-006665; DOE/CS-0127/3) Avail: NTIS HC A99/MF A01

Simple analytical methods concerning the design of passive solar heating systems are presented with an emphasis on the average annual heating energy consumption. Key terminology and methods are reviewed. The solar load ratio (SLR) is defined, and its relationship to analysis methods is reviewed. The annual calculation, or Load Collector Ratio (LCR) method, is outlined. Sensitivity data are discussed. Information is presented on balancing conservation and passive solar strategies in building design. Detailed analysis data are presented for direct gain and sunspace systems, and details of the systems are described. Key design parameters are discussed in terms of their impact on annual heating performance of the building. These are the sensitivity data. The SLR correlations for the respective system types are described. The monthly calculation, or SLR method, based on the SLR correlations, is reviewed. Performance data are given for 9 direct gain systems and 15 water wall and 42 Trombe wall systems. DOE

N83-26302# Massachusetts Inst. of Tech., Cambridge. Energy Lab.
SOLAR DISTRICT-HEATING SYSTEM USING SEASONAL STORAGE FOR THE CHARLESTOWN, BOSTON NAVY YARD REDEVELOPMENT PROJECT
Dwayne Breger Sep. 1982 109 p refs Prepared for Argonne National Lab., Ill.
(Contract W-31-109-eng-38)
(DE83-006184; ANL-82-90) Avail: NTIS HC A06/MF A01

A preliminary analysis is presented for a seasonal storage solar heating system for the Charlestown Navy Yard in Boston, Massachusetts. The system makes use of two large, buried concrete storage tanks totalling 5700 m(3) as a water heat store. The analysis makes extensive use of MINSUN, a computer performance and economic simulation routine written specifically for solar seasonal storage systems. The system performance and economics are analyzed for different collector types and areas, component costs, exogenous economic conditions, and optional inclusion of a heat pump. System cost-effectiveness is defined in relation to an economic break-even situation with respect to a conventional system, and is presented in terms of a solar premium, which is the incremented cost for the solar system per megawatt hour (MWH) of conventional fuel displaced. Results indicate a solar premium of about $15 per MWH for parabolic collectors and $10 MWH for advanced evacuated tubes given estimated 1985 collector costs. DOE

N83-26303# Texas Univ., Austin. Center for Energy Studies.
GULF COAST GEOPRESSURED-GEOTHERMAL RESERVOIR SIMULATION, YEAR 4 Final Report, 1 Aug. 1979 - 31 Jul. 1980
R. C. MacDonald, K. Sepehrnoori, and H. Ohkuma Oct. 1982 96 p refs
(Contract DE-AC08-79ET-27112)
(DE83-005668; DOE/ET-27112/3) Avail: NTIS HC A05/MF A01

The results of the short-term production tests run on the Pleasant Bayou No. 2 well are summarized. These tests were analyzed using conventional pressure test analysis methods. The effects of reservoir heterogeneties on production behavior and, in particular, permeability distribution and faulting of reservoir sand were studied to determine the sensitivity of recovery to these parameters. A study on the effect of gas buildup around a producing well is reported. DOE

N83-26304# Boeing Computer Services, Inc., Seattle, Wash.
INTERMEDIATE PHOTOVOLTAIC SYSTEM APPLICATION EXPERIMENT OPERATION PERFORMANCE REPORT, FOR SEPTEMBER 1982. VOLUME 15: FOR LOVINGTON SQUARE SHOPPING CENTER, LOVINGTON, NEW MEXICO
Jan. 1983 26 p Prepared for Sandia Labs., Albuquerque, N. Mex.

(Contract D-AC04-76DP-00789)
(DE83-006424; SAND-81-7085/15) Avail: NTIS HC A03/MF A01

The data accumulated at the intermediate photovoltaic project at Lovington Square Shopping Center, Lovington, New Mexico are presented. Generated energy and environmental (weather) data are presented graphically. Explanations of irregularities not attributable to weather are provided. DOE

N83-26305# Brookhaven National Lab., Upton, N. Y. Dept. of Energy and Environment.
FLASH PRYOLYSIS OF BIOMASS WITH REACTIVE AND NONREACTIVE GASES
Muthu S. Sundaram, Meyer Steinberg, and Peter Fallon Oct. 1982 27 p refs Presented at the Intern. Conf. on the Fundamentals of Thermochem. Biomass Conversion, Estes Park, Colo., 18-22 Oct. 1982
(Contract DE-AC02-76CH-00016)
(DE83-005808; BNL-32280; CONF-821051-5) Avail: NTIS HC A03/MF A01

Studies were done on the flash pyrolysis of Douglas Fir wood in the presence of reactive and nonreactive gases including hydrogen, methane, and helium. Pyrolysis and gasification of the wood particles was done in one step, without catalysts. Almost complete (98%) gasification of the carbon in Douglas fir wood was achieved at 10000C and 500-psi hydrogen pressure. The reaction products were methane, ethane, ethylene, carbon monoxide, BTX, and water. Flash hydropyrolysis produced a large yield of hydrocarbon gases (up to 78% C) comprising methane and ethane. High yields of ethylene (up to 21% C) and BTX (up to 12% C) were obtained via methane pyrolysis of fir wood; a free radical mechanism is proposed to explain the enhanced yield of ethylene in a methane atmosphere. DOE

N83-26306# Exxon Research and Engineering Co., Linden, N.J. Advanced Energy Systems Labs.
DEVELOPMENT OF A CIRCULATION ZINC-BROMINE BATTERY, PHASE 1
R. Bollows, H. Einstein, P. Grimes, E. Kantner, P. Malachesky, K. Newby, and H. Tsien Jan. 1983 185 p refs
(Contract DE-AC04-76DP-00789)
(DE83-006841; SAND-82-7022) Avail: NTIS HC A09/MF A01

A three phase program aimed at developing a circulating zinc bromine battery for photovoltaic energy storage is summarized. This approach incorporates carbon plastic electrodes in a bipolar stack design, a circulating electrolyte with separable bromine complexes, and shunt current protection are incorporated. Successful scale up and demonstration of 3 and 10 kWh submodules were completed. Two smaller demonstration batteries were for testing. Important technology improvements were demonstrated concerning shunt current protection, improved performance of low cost microporous separators, and insert injection molding of electrodes and separators. Ease technology was expanded via an increased parametric testing program, materials testing and electrolyte studies. Production cost estimates were revised based on improved design concepts to project direct factory costs for large scale production of 20 kWh modules. A potential developmental was drafted, delineating critical development milestones. The project effort is continuing to show steady progress toward developing a deliverable 20 kWh photovoltaic battery. DOE

N83-26307# National Academy of Sciences - National Research Council, Arlington, Va.
RESEARCH AGENDA: ENERGY CONSERVATION IN BUILDINGS AND COMMUNITY SYSTEMS
1982 63 p refs
(Contract DE-AC01-77CS-20436)
(DE82-019465; DOE/CS-20436/T1) Avail: NTIS HC A04/MF A01

An agenda is presented on research needs in the field of energy conservation within buildings and communities to be supported by the federal government. The agenda is developed in a futures perspective, presenting material that would be relevant for research and development five or more years from the present. An overview is provided of agenda setting in general, pointing out some of the difficulties as well as possible approaches that any group might encounter while planning research for future, as yet unspecified, needs. A set of boundary conditions was created to help determine subject areas that should be part of this agenda. Twenty-seven subjects are described as appropriate for areas of research. They are organized into six categories - broad classes of interest under which all related research can be grouped. A description of each category and area is provided, along with suggested topics of specific research projects. DOE

N83-26308# Massachusetts Inst. of Tech., Cambridge. Energy Lab.
RESIDENTIAL-ENERGY-DEMAND MODELING AND THE NIECS DATA BASE: AN EVALUATION
T. G. Cowing, J. A. Dubin, and D. McFadden Jan. 1982 250 p refs
(Contract DE-AM01-76EI-02295)
(DE82-013659; MIT-EL-82-009) Avail: NTIS HC A11/MF A01

The 1978-1979 National Interim Energy Consumption Survey (NIECS) data base was evaluated in terms of its usefulness for estimating residential energy demand models based on household applicance choice and utilization decisions. The NIECS contains detailed energy usage information at the household level for 4081 households during the April 1978 to March 1979 period. Among the data included are information on the structural and thermal characteristics of the housing unit, demographic characteristics of the household, fuel usage, appliance characteristics, and actual energy consumption. The survey covers the four primary residential fuels-electricity, natural gas, fuel oil, and liquefied petroleum gas - and includes detailed information on recent household conservation and retrofit activities. DOE

N83-26309# TRW, Inc., Oak Ridge, Tenn.
THE RD/D OPPORTUNITIES FOR LARGE AIR-CONDITIONING AND HEAT-PUMP SYSTEMS Final Report
M. MacDonald, D. Goldenberg, and E. Hudgins Jun. 1982 136 p refs
(Contract W-7405-eng-26)
(DE82-018406; ORNL/Sub-80-13817/1) Avail: NTIS HC A07/MF A01

The marketplace factors that constrain a more rapid implementation of energy-conserving heating, ventilating, and air conditioning (HVAC) systems and system operation in commercial buildings are summarized. The focus was on large air conditioning and heat pump equipment. Use of currently available energy-efficient equipment and systems is presently limited by the economic situation of the building owners. Although case histories of energy-efficient buildings highlight the potential of new and existing equipment and systems, the majority of systems and equipment being installed today do not measure up to that potential. The major recommendations deal with developing the market for energy-efficient HVAC systems by reversing existing market forces that promote energy consumption; promoting technical research and educational programs; increasing the number of technical people competent in the area of high-efficiency system application and maintenance. DOE

N83-26310# Pacific Northwest Lab., Richland, Wash.
THE US ENERGY CONVERSION AND USE CHARACTERISTICS
C. H. Imhoff, A. Liberman, and W. B. Ashton Feb. 1982 262 p refs
(Contract DE-AC06-76RL-01830)
(DE82-008616; PNL-4075) Avail: NTIS HC A12/MF A01

The long-range goal of the Energy Conversion and Utilization Tehnology (ECUT) Program is to enhance energy productivity in all energy-use sectors by supporting research on improved efficiency and fuel switching capability in the conversion and utilization of energy. Regardless of the deficiencies of current information, a summary of the best available energy-use information is needed now to support current ECUT program planning.

This document is the initial draft of this type of summary and serves as a data book that will present current and periodically updated descriptions of the following aspects of energy use: gross US energy consumption in each major energy-use sector; energy consumption by fuel type in each sector; energy efficiency of major equipment/processes; and inventories, replacement rates, and use patterns for major energy-using capital stocks. DOE

N83-26311# Sandia Labs., Albuquerque, N. Mex.
RECENT DEVELOPMENTS IN Li(Si)FeS2 THERMAL BATTERY TECHNOLOGY
Jimmie Q. Searcy, Rod K. Quinn, and Harry J. Saxton 1982 28 p refs Presented at the 13th Intern. Power Sources Symp., Brighton, England, 27 Sep. 1982
(Contract DE-AC04-76DP-00789)
(DE82-011929; SAND-81-2218C; CONF-820907-1) Avail: NTIS HC A03/MF A01

The Li(Si)/FeS2 electrochemical system has been under development for thermal battery applications as an alternative to Ca/CaCrO4 for several years at Sandia National Laboratories (SNL). The new technology differs from the old in that the anode is a pressed powder (44 wt % lithium in Li(Si) alloy) as opposed to sheet calcium or bimetal; and a separator composed of LiCl.KCl eutectic electrolyte and MgO binder is required with a separate cathode pellet composed of FeS2 and electrolyte to replace the DEB pellet; and current collectors which may actually function as temperature moderators are always used. The applications require high reliability (typically, a success probability of 0.995) and a twenty-five year shelf-life. Consequently, a substantial materials effort has been necessary to assess degradation and deleterious reactions during storage and to determine necessary production specifications and controls. DOE

N83-26312# Gesellschaft fuer Kernenergieverwertung in Schiffbau und Schiffahrt m.b.H., Geesthacht (West Germany). Zentralabteilung Technikum.
THE PELLWORM TEST FIELD FOR SMALL AND INTERMEDIATE WIND ENERGY CONVERSION SYSTEMS ON THE GERMAN COAST OF THE NORTH SEA
S. Fries, G. Petersen, and H.-T. Mengelkamp 1982 25 p refs Presented at 4th Intern Symp. on Wind Energy Systems, Stockholm, 21-24 Sep. 1982; sponsored by BHRA Fluid Engineering
(GKSS-82/E/39; ISSN-0344-9629) Avail: NTIS HC A02/MF A01

A test program involving 10 kW wind energy converters is described. The electrical power output of the converters as a function of the wind speed; annual energy production of the converters; investment costs per installed kW; and the cost of a produced kWh are calculated. Nine 10 m diameter machines are tested. The ac frequency and the rotor RPM are continuously calculated from the measured data by a microprocessor. The yaw angle for each horizontal axis machine is measured. Meteorological parameters are also recorded. Five of the converters are shown to be unsuited to the harsh climate of the test site. Author (ESA)

N83-26313# Aerospace Engineering Office, Zurich (Switzerland).
STUDY OF INTERNAL STRESSES OF THIN SOLAR CELL MODULES Final Report
K. J. Zimmermann and U. Haeverli Paris ESA 29 Jun. 1982 49 p refs
(Contract ESTEC-4815/81/NL-JS(SC))
(Rept-37-155/NT; ESA-CR(P)-1696) Avail: NTIS HC A03/MF A01

Three solar cell computer programs were converted from MARC into NASTRAN. The meshes were generated by the AEO interactive SIMP package. The results of these conversions were compared with test results. The computer programs used to compute the interconnector and wiring stresses were implemented into SIMP. By applying fatigue properties of solar cell interconnectors, the life cycle can be determined using thermal distortion results of the solar cell modules. It is shown that the computation of the module internal stresses can be performed within a few days and at a lower cost than the previous analysis steps. Author (ESA)

N83-26314# European Space Agency, Paris (France).
VALIDATION OF SOLAR COLLECTOR MEASUREMENTS UNDER NATURAL AND SIMULATED CONDITIONS
Wilfried Ley Feb. 1983 202 p refs Transl. into ENGLISH of "Bewertung von Solarkollektormessungen unter natuerlichen u. simulierten Bedingungen" DFVLR, Rept. DFVLR-FB-82-05, Cologne (West Germany), 1981 Original report in GERMAN previously announced as N82-32891
(ESA-TT-775; DFVLR-FB-82-05) Avail: NTIS HC A10/MF A01; original German version available from DFVLR, Cologne DM 59,40

The performance characteristics, heat losses, azimuthal angular dependence and effects of different environmental parameters were determined for low temperature flat plate solar collectors, under natural and simulated conditions. Results indicate that outdoor tests can be replaced by indoor measurements, using a simplified solar simulator and a climatic chamber. Author (ESA)

N83-26315# National Oceanic and Atmospheric Administration, Washington, D. C. Office of Ocean Minerals and Energy.
OCEAN THERMAL ENERGY CONVERSION: ENVIRONMENTAL EFFECTS ASSESSMENT PROGRAM PLAN 1981-1985
Jun. 1982 63 p refs
(PB83-142570; NOAA/T-82-188; NOAA-82111702) Avail: NTIS HC A04/MF A01 CSCL 10B

This plan describes the program of research for FY 1981-1985 that is necessary to begin to assess the effects on the environment of ocean thermal energy conversion facilities and plantships. GRA

N83-26316# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
OCEAN THERMAL ENERGY AT THE JOHNS HOPKINS UNIVERSITY APPLIED PHYSICS LABORATORY Quarterly Report, Apr. - Jun. 1982
Jul. 1982 33 p refs
(Contract DE-AI01-83ET-20342)
(PB83-147306; JHU/APL/OQR/82-2) Avail: NTIS HC A03/MF A01 CSCL 10A

Ocean Thermal Energy Conversion (OTEC) systems that provide synthetic fuels (e.g., methanol), energy intensive products such as ammonia (for fertilizers and chemicals), and aluminum were developed. The work also includes assessment and design concepts for hybrid plants, such as geothermal OTEC (GEOTEC) plants. Management of the conceptual design activity of the two industry teams that are designing offshore OTEC pilot plants that could deliver power to Oahu, Hawaii is discussed. In addition, a program in which tests of a different kind of ocean energy device, a turbine that is air driven as a result of wave action in a chamber is being planned. GRA

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N83-26317# California Univ., Los Angeles. Lab. of Biomedical and Environmental Sciences.
ENVIRONMENTAL ASSESSMENT OF THE US DEPARTMENT OF ENERGY'S SOLAR THERMAL TECHNOLOGY PROGRAM
R. G. Lindberg, ed., J. I. Daniels (California Univ., Lawrence Livermore Lab.), J. Hastings, and S. Phinney (Jacobs Engineering Group., Inc., Pasadena, Calif.) Jun. 1982 226 p refs
(Contract DE-AM03-76SF-0012)
(UCLA-12-1372) Avail: NTIS HC A11/MF A01

Resource impacts, climate, ecology, air quality, water quality, solid waste, health and safety, and impacts of fluid releases are addressed. Author

N83-26318# Argonne National Lab., Ill.
RADIOLOGICAL AND ENVIRONMENTAL RESEARCH DIVISION REPORT Annual Report, Jan. - Dec. 1981
P. M. Irving, J. A. Maley (William and Mary Coll., Williamsburg,

Va.), and C. M. Gradert (Westmar Coll., LeMars, Iowa) Jul. 1981 90 p refs
(ANL-81-85) Avail: NTIS HC A05/MF A01

An interlaboratory cooperative study was initiated with the following objectives: (1) standardize techniques and procedures for acid rain studies so that reasonable agreement is obtained among cooperating laboratories; and (2) devise cooperative and complementary experiments to test hypotheses among the associated laboratories. Author

N83-26319# National Oceanic and Atmospheric Administration, Boulder, Colo. Office of Marine Pollution Assessment.

CONTAMINANT INPUTS TO THE HUDSON-RARITAN ESTUARY

James A. Mueller, Theresa A. Gerrish, and Maureen C. Casey Aug. 1982 315 p refs
(NOAA-OMPA-21) Avail: NTIS HC A14/MF A01

Source locations and an estimate of the magnitude of contaminant inputs to the Hudson-Raritan Estuary are presented. The relative contribution of the various sources is indicated and data gaps are identified. Six sources of contaminant inputs were evaluated: nontidal tributary, municipal and industrial wastewater, atmospheric, urban runoff, accidental spills, and landfill leachate. The latter five sources were evaluated downstream of the tributary water quality stations, since sources above these points are reflected in the tributary inputs. In addition to flow or volume for each source, data on concentrations of conventional pollutants (solids, organic matter, nutrients, and bacterial indicators), organic toxics, and heavy metals were sought. A large quantity of data was obtained from numerous federal, state, county, and municipal agencies, and private firms. The data were analyzed to obtain average mass loads of specific contaminants into the Hudson-Raritan Estuary. S.L.

N83-26320# Mitre Corp., McLean, Va.

FAA INTEGRATED NOISE MODEL VALIDATION: ANALYSIS OF AIR CARRIER FLYOVERS AT SEATTLE-TACOMA AIRPORT

George W. Flathers, II Washington FAA Nov. 1982 73 p refs (Contract DTFA01-82-C-10003)
(AD-A124097; FAA-EE-82-19; MTR-82W162) Avail: NTIS HC A04/MF A01 CSCL 09/2

The Federal Aviation Administration's Integrated Noise Model (INM) is a series of computer programs designed to estimate environmental noise levels in the vicinity of an airport. As part of the effort's to validate INM outputs for the FAA, comparisons were made between the Sound Exposure Levels (SEL) of actual aircraft flyovers at Seattle-Tacoma International Airport and SELs which were computed by the INM for identical conditions. Data for this analysis were obtained from the FAA ARTS-III radar to determine the actual slant range and velocity of observed aircraft, and from noise monitors located beyond each runway end to determine actual SEL values associated with observed aircraft. The report presents the results of the comparison of INM and observed SEL values for seven transport-category aircraft. GRA

N83-26321# Naval Research Lab., Washington, D. C.

ATMOSPHERIC METHANE CONCENTRATIONS IN THE ARCTIC AND SUBARCTIC REGIONS: 1971-1979 Interim Report

R. A. Lamontagne 23 Dec. 1982 7 p refs
(AD-A123862; AD-E000521; NRL-8652) Avail: NTIS HC A02/MF A01 CSCL 04/1

Atmospheric methane data were collected by NRL personnel in the Arctic and subarctic regions from 1971 to 1979. These data show an average increase of approximately 0.5% to 0.6% per year increase. The data do not support the increase of 2% per year obtained by extrapolating methane measurements obtained from 1979 to 1981. No information is available from the NRL data to determine if the increase will continue at its present rate (2%/yr), decreases or become cyclic. GRA

N83-26322# Federal Aviation Administration, Washington, D.C. Office of Environment and Energy.

A SURVEY OF HELICOPTER AND AMBIENT URBAN NOISE LEVELS IN PHOENIX, ARIZONA Final Report

J. Steven Newman Sep. 1982 44 p
(AD-A123856; FAA-EE-82-20) Avail: NTIS HC A03/MF A01 CSCL 20/1

The FAA has been conducting controlled helicopter noise measurement programs since 1976. The data have been used for a variety of purposes including evaluation of proposed U.S. and international noise standards, validation of helicopter noise prediction methodologies, and development of practical heliport design guidance. In order to supplement the results of the controlled tests, field survey data are also being gathered to represent in-service operating conditions. Measurements are intended to represent helicopter noise within the context of urban ambient background noise. The results reported in this document are termed 'survey measurements', as opposed to controlled test data, in order to reflect the limited control imposed over factors which contribute to the variability of measured noise levels. Noise data are presented for the Bell 206-L, Aerospatiale Alouette III, and the Aerospatiale A-Stare, SA-350. Operational modes include approach, takeoff, hover, and flat-pitch-idle. Noise data include A-weighted Sound Level time histories, maximum A-Weighted Sound Level (LASm), Sound Exposure Level (LAE), and Equivalent Sound Level (Leq). Author (GRA)

N83-26323# Department of Energy, Washington, D. C. Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness.

ENVIRONMENTAL COMPLIANCE GUIDE: GUIDANCE MANUAL FOR DEPARTMENT OF ENERGY COMPLIANCE WITH THE ENDANGERED SPECIES ACT

Jun. 1982 66 p refs
(DE82-019221; DOE/ER-0058-Vol-3A) Avail: NTIS HC A04/MF A01

The Endangered Species Act requires federal agencies to ensure that none of their actions jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of designated critical habitat for such species. The Department is required to consult with the US Fish and Wildlife Service and/or the National Marine Fisheries Service, and if advised by these agencies that an endangered or threatened species or critical habitat may be affected, prepare a biological assessment of the effects of the proposed action. The content of a biological assessment is based on existing information on the federally protected species and habitats, data and observations from limited site surveys or visits, and consultations with local experts on the species. Information in the biological assessment is used by the responsible agencies as a basis for evaluating the effects of the proposed DOE action on species federally protected. DOE

N83-26324# California Univ., San Diego, La Jolla.

EFFECT OF INCREASING CO2 ON OCEAN BIOTA. VOLUME 2, PART 5: ENVIRONMENTAL AND SOCIETAL CONSEQUENCES OF A POSSIBLE CO2-INDUCED CLIMATE CHANGE

Osmund Holm-Hansen Jul. 1982 26 p refs 2 Vol.
(Contract DE-AS01-79EV-10019)
(DE82-020250; DOE/EV-10019/2-Vol-2) Avail: NTIS HC A03/MF A01

Attempts to predict the most important biological effects on the marine biota caused by increased atmospheric CO2 concentrations and concomitant climactic changes are discussed. Particular attention is placed on phytoplankton, benthic plants, microbial cells, zooplankton, and fish stocks, and how changes in one or more of these trophic levels can result in significant changes in the nature and dynamics of the overall food web. Surface waters of the entire marine environment are considered, including the intertidal zone and estuaries; deeper waters are not considered. The major environmental factors considered are: an increase in atmospheric CO2 concentrations; an increase in atmospheric temperature; a decrease in pH of ocean water; and an increase in atmospheric ozone concentration. The magnitude and temporal aspects of these

atmospheric changes are based on previously developed models.
DOE

N83-26325# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
GUIDELINES FOR ENVIRONMENTAL MONITORING IN UNDERGROUND COAL MINES. PHASE 1: MINERALS RESEARCH CONTRACT REPORT, 1981 - 1982
H. A. Wright, R. Madden, and M. N. Rubin Jun. 1982 177 p refs
(Contract DI-BM-J0-100039)
(PB83-147777; BUMINES-OFR-180-82; BBN-4859) Avail: NTIS HC A09/MF A01 CSCL 08I

This report assess the economic, legal, institutional, and technical factors that affect the current and future status of implementation of mine monitoring systems in the United States. It begins with a description of a poll of the Mining Production Research Committee and the Mine Monitoring and Communications Committee of Bituminous Coal Research that was conducted to establish industry monitoring needs and constraints. Existing systems in the United States and foreign counties are then reviewed and compared with the requirements set forth by the industry committees. At the same time, State and Federal mining laws are reviewed, and equipment presently available from suppliers of mine monitoring systems and components is discussed. Author (GRA)

N83-26326# Environmental Sciences Research Lab., Research Triangle Park, N.C. Atmospheric Chemistry and Physics Div.
ATMOSPHERIC CHEMISTRY OF SEVERAL TOXIC COMPOUNDS Final Report
Edward Edney, Steven Mitchell, and Joseph J. Bufalini Nov. 1982 120 p refs
(PB83-146340; EPA-600/3-82-092) Avail: NTIS HC A06/MF A01 CSCL 07D

The hydroxyl radical initiated gas phase oxidation of several toxic compounds in nitrous acid, oxides of nitrogen, in air mixtures were investigated. The chemical species studied were: formaldehyde, acrylonitrile, vinylidene chloride, trichloroethylene, allyl chloride, acetaldehyde, and acrolein. Propylene and ethylene were also studied for comparative purposes. Experimental protocols were established for measuring hydroxyl rate constants. Product studies were also conducted. The results and their atmospheric implications are dicussed. Author (GRA)

N83-26327# Syracuse Univ., N. Y.
FACTORS INFLUENCING METAL ACCUMULATION BY ALGAE Final Report, Sep. 1976 - Jan. 1979
J. Charles Jennett, J. E. Smith, and J. M. Hassett Dec. 1982 133 p refs
(Grant EPA-R-804734)
(PB83-149377; EPA-600/2-82-100) Avail: NTIS HC A07/MF A01 CSCL 13B

Shallow beds of algae (algal meanders) have proved to be highly effective at removing heavy metals and organometallics from lead-zinc mine and mill wastes. A research program was initiated (1) to determine conditions under which algae were most effective at concentrating significant quantities of As, Cd, Cu, Hg, Ni, Pb, or Zn, and (2) to apply the meander technology to types of wastewater-metal problems. GRA

N83-26328# PEDCo-Environmental, Inc., Cincinnati, Ohio.
NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS. A COMPILATION AS OF AUGUST 1, 1982
Aug. 1982 367 p
(Contract EPA-68-01-6310)
(PB83-147843; EPA-340/1-82-006; PN-3660-1-42) Avail: NTIS HC A16/MF A01 CSCL 13B

Since their inception in 1971, the National Emission Standards for Hazardous Air Pollutants (NESHAP's) were expanded or revised 69 times with an additional 13 changes proposed. This document is a compilation of all Federal Register activity related to the MESHAP's since 1971 and supercedes all previous compliations. Section I is an introduction to the standards, explaining their purpose and interpreting the working concepts which have developed through their implementation. Section II contains a 'quick-look' summary of each standard, including the dates of proposal promulgation, and any subsequent revisions. Section III is the complete standards with all amendments incorporated into the material. Section IV contains the full text of all revisions, including the preamble which explains the rationale behind each revision. Section V is all proposed amendments to the standards.
Author (GRA)

N83-26329# Cramer (H.E.) Co., Inc., Salt Lake City, Utah.
RECOMMENDATIONS ON A SHORTZ/LONGZ SO2 AIR QUALITY MODEL METHODOLOGY FOR THE TACOMA TIDEFLATS AREA Final Report
J. F. Bowers, W. R. Hargraves, and A. J. Anderson Nov. 1982 194 p refs
(Contract EPA-68-02-2547)
(PB83-146795; EPA-910/9-82-090; TR-82-146-01) Avail: NTIS HC A09/MF A01 CSCL 13B

The primary purpose of the study described in this report was to develop a methodology for applying the SHORTZ/LONGZ complex terrain dispersion models to the existing and proposed SO2 sources located within and adjacent to the Tacoma, Washington tide-flats area. The major tasks of the study were to: (1) review the meteorological and air quality data available for the Tacoma area to determine the meteorological conditions associated with the highest observed SO2 concentrations; (2) evaluate the performance of the SHORTZ and LONGZ models in the Tacoma area following procedures currently recommended by the U.S. Environmental Protection Agency (EPA); and (3) prepare a report specifying procedures for using the SHORTZ/LONGZ models in the Tacoma area, including source inputs, meteorological inputs and receptor arrays. GRA

N83-26330# Inco Research and Development Center, Inc., Suffern, N.Y.
ASSESSMENT OF CRITICAL METALS IN WASTE CATALYSTS Open File Report, 1 Oct. 1981 - 20 Aug. 1982
Francis J. Hennion and Josef Farkas Sep. 1982 170 p refs
(Contract DI-BM-J0-15042)
(PB83-144832; BM-OFR-197-82) Avail: NTIS HC A07/MF A01 CSCL 13B

A survey was conducted of the U.S. catalysst industry for the purpose of defining critical metals usage and disposition. The petroleum, chemical, and environmental (industrial and automotive emission control) industries were encompassed. Metals used for catalysts in these industries include nickel, cobolt, molybdenum, vanadium, tungsten, chromium, iron, copper, zinc, and precious metals--platinum, palladium, rhodium, rhenium, silver, and gold. In recent years, about 27 million pounds of non-noble metals were consumed for catalysts annually. Over half of this, primarily metals of lower value or concentration, is currently not recycled. However, the more valuable nickel, cobalt, molybdenum, and tungsten are extensively recycled. GRA

N83-26331# Environmental Sciences Research Lab., Research Triangle Park, N.C.
FINAL EVALUATION OF URBAN-SCALE PHOTOCHEMICAL AIR QUALITY SIMULATION MODELS
Kenneth L. Schere and Jack H. Shreffler Dec. 1982 258 p refs
(PB83-147991; EPA-600/3-82-094) Avail: NTIS HC A12/MF A01 CSCL 13B

The research study discussed here is a continuation of previous work whose goal was to determine the accuracy of several selected urban photochemical air quality simulation models using data from the Regional Air Pollution Study in St. Louis. This work reports on the testing of three models with a sample size of 20 days. The models evaluated here are: The Photochemical Box Model (PBM), The Lagrangian Photochemical Model (LPM), and The Urban Airshed Model (UAM). Emphasis in this report is directed at the ability of the models to reproduce the maximum 1-hour ozone concentrations observed on 20 days selected from nearly 2 years of data. Author (GRA)

N83-26416# Proctor and Gamble Co., Cincinnati, Ohio. Biological Investigations Sect.
ASSESSING THE HAZARD OF CHEMICALS TO AQUATIC LIFE: A PERSPECTIVE ON THE STATE-OF-THE-ART
William E. Bishop *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 321-335 refs (For primary document see N83-26400 15-51)
(PAPER-19) Avail: NTIS HC A16/MF A01 CSCL 06/3

N83-26417# SRI International Corp., Menlo Park, Calif.
BEHAVIOR OF HYDROCARBON FUELS IN AQUATIC SYSTEMS
J. H. Smith and J. C. Harper *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 336-353 (For primary document see N83-26400 15-51)
(PAPER-20) Avail: NTIS HC A16/MF A01 CSCL 06/3

N83-26419# Army Medical Bioengineering Research and Development Lab., Fort Detrick, Md.
UTILIZATION OF AQUATIC ORGANISMS FOR CONTINUOUSLY MONITORING THE TOXICITY OF INDUSTRIAL WASTE EFFLUENTS
W. H. vanderSchalie *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 370-392 refs (For primary document see N83-26400 15-51)
(PAPER-22) Avail: NTIS HC A16/MF A01 CSCL 06/3

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N83-26332*# Delaware Univ., Newark. Dept. of Geology.
SOLUTION OF NATURALLY-OCURRING GLASSES IN THE GEOLOGICAL ENVIRONMENT Final Technical Report
Billy P. Glass Dec. 1982 66 p refs
(Contract NAS5-26273)
(NASA-CR-170518; NAS 1.26:170518) Avail: NTIS HC A04/MF A01 CSCL 08G

As part of a study to investigate the feasibility of putting nuclear wastes in glass containers and burying them on land or dumping them in the ocean, the amount of solution experience by naturally occurring glasses from two land sites and thirty-four deep sea sites was studied. The glasses are microtektites from three strewn fields and from the Zhamanshin impact crater. The microtektites range in age from 0.7 to 35 m.y. and have a wide range in composition. The weight percent SiO2, for example, ranges from 44.8 to 81.7. Although several criteria for determining the amount of solution were considered, most of the conclusions are based on two criteria: (1) width of cracks, and (2) elevation of silica rich inclusions above the adjacent microtektite surface. All the measurements were made on scanning electron microscope photomicrographs of the microtektites. S.L.

N83-26333*# Aerospace Corp., El Segundo, Calif. Space Sciences Lab.
EDDY INTRUSTION OF HOT PLASMA INTO THE POLAR CAP AND FORMATION OF POLAR-CAP ARCS
Y. T. Chiu and D. J. Gorney 30 May 1983 25 p refs
(Contract NASw-3434)
(NASA-CR-170377; NAS 1.26:170377; ATR-81(7951)-3) Avail: NTIS HC A02/MF A01 CSCL 04A

Under the simple postulate that multiple large scale detachable magnetospheric convection eddies can exist in the vicinity of the convection reversal boundary and in the polar cap, by Kelvin-Helmholtz instability or otherwise, it is shown that a number of seemingly disconnected plasma and electric field observations in the polar cap can be organized into a theory of magnetosheath and plasmasheet plasma intrusion into the polar cap. Current theory of inverted V structures then predicts existence of similar, but weaker, structures at the eddy convection reversal boundaries in the polar cap. A possible consequence is that the polar cap auroras are natural offshoots from discrete oval arcs and evidently are formed by similar processes. The two arc systems can occassionally produce an optical image in the form of the theta aurora. S.L.

N83-26334# Massachusetts Univ., Amherst. Astronomy Research Facility.
SCRIBE 2 DATA ANALYSIS Scientific Report, 1 Nov. 1981 - 15 Apr. 1982
H. Sakai and G. A. Vanasse (AFGL, Hanscom AFB, Mass.) Hanscom AFB, Mass. AFGL Apr. 1982 54 p refs
(Contract F19628-81-K-0007; AF Proj. 2310)
(AD-A116250; AFGL-TR-82-0150; SR-2) Avail: NTIS HC A04/MF A01 CSCL 04/1

The data collected by the SCRIBE flight were analyzed. The flight history and the data obtained, centered at the 15 microns CO2 band, are summarized. The down looking spectra obtained with O.2 cm-1 resolution produced no unusual features, while the horizontal looking spectra obtained with the same resolution figure yielded remarkable findings, a continuum background feature superimposed with the molecular feature and a large variation in the radiance level at 27000 to 28000 m altitude for both the molecular and the continuum feature. A.L.

N83-26335*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
OZONE DENSITY MEASUREMENTS IN THE TROPOSPHERE AND STRATOSPHERE OF NATAL [MEDIDAD DE OZONIO NA TROPOSFERA E ESTRATOSFERA DE NATAL]
V. W. J. H. Kirchhoff and A. G. Motta Apr. 1983 20 p refs In PORTUGUESE; ENGLISH summary Presented at the 35th Ann. Reunion of the SBPC Sponsored by NASA
(NASA-CR-172625; NAS 1.26:172625; INPE-2708-PRE/296) Avail: NTIS HC A03/MF A01 CSCL 04A

Ozone densitities were measured in the troposphere and stratosphere of Natal using ECC sondes launches on balloons. The data analyzed so far show tropospheric densities and total ozone contents larger than expected. Author

N83-26336# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
EARTH ATMOSPHERE OZONE MODEL [MODELAGEM DO OZONIO DA ATMOSFERA TERRESTRE]
Volker W. J. H. Kirchhoff Apr. 1983 36 p refs In PORTUGUESE; ENGLISH summary Presented at the 35th Reunion of the SBPC (INPE-2698-PRE/294) Avail: NTIS HC A03/MF A01

Ozone modeling in the different regions of the atmosphere is discussed. After photochemical considerations of a simple oxygen only atmosphere, the effects of adding hydrogen and nitrogen constituent are shown in the height region between 0 and 140 km. Diffusion effects especially at the atomic oxygen peak are discussed and finally the diurnal variations are calculated for several height levels. Author

N83-26337# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ATMOSPHERIC ANGULAR MOMENTUM BALANCE [O BALANCO DE MOMENTUM ANGULAR NA ATMOSFERA]
Marco Antonio Maringolo Lemes and Yoshihiro Yamazaki Apr. 1983 36 p refs In PORTUGUESE; ENGLISH summary
(INPE-2700-MD-022) Avail: NTIS HC A03/MF A01

A didatic and objective, reference material on the problem of angular momentum budget in the atmosphere is presented. It includes the derivation of the appropriate budget equation and its subsequent physical interpretation, strongly supported by observational evidence. S.L.

N83-26338# Boston Coll., Chestnut Hill, Mass. Dept. of Physics.
A COMPENDIUM OF THEORETICAL ATMOSPHERIC TIDAL STRUCTURES. PART 1: MODEL DESCRIPTION AND EXPLICIT STRUCTURES DUE TO REALISTIC THERMAL AND GRAVITA-

TIONAL EXCITATION Interim Report
J. M. Forbes and D. F. Gillette 24 Jun. 1982 193 p refs Sponsored by AFGL
(AD-A125720; AFGL-TR-82-0173(1); ERP-780(1)) Avail: NTIS HC A09/MF A01 CSCL 08/7

The equations, coefficient parameterizations, method of numerical solution, and results from a theoretical (numerical) model of atmospheric tidal oscillations from the surface to 400 km are given. The westerly, northerly, and vertical winds and temperature are governed by four second order partial differential equations derived from the perturbation fluid equations for momentum, continuity, thermal energy, and the ideal gas law applied to a spherical, rotating, viscous atmosphere with anisotropic ion drag. The equations represent perturbations about a basic atmospheric state with latitude- and height-dependent mean winds, temperature, and composition. Model parameterizations described include mean winds and temperatures, molecular and eddy viscosity and thermal conductivity, ion-neutral collision frequency for momentum transfer, and solar thermal and lunar gravitational forcing. Thermal excitation occurs via absorption of ultraviolet radiation in the thermosphere, H2O insolation absorption in the troposphere and lower stratosphere, and O3 insolation absorption in the mesosphere. GRA

N83-26339# Boston Coll., Chestnut Hill, Mass. Dept. of Physics.
A COMPENDIUM OF THEORETICAL ATMOSPHERIC TIDAL STRUCTURES. PART 2: THERMOSPHERIC EXTENSIONS OF THE CLASSICAL EXPANSION FUNCTIONS FOR SEMIDIURNAL TIDES Interim Report
J. M. Forbes, M. E. Hagan, E. DiCesare (AFGL, Hanscom AFB, Mass.), and D. F. Gillette (AFGL, Hanscom AFB, Mass.) 24 Jun. 1982 153 p refs Sponsored by AFGL
(AD-A125725; AFGL-TR-82-0173(2); ERP-780(2)) Avail: NTIS HC A08/MF A01 CSCL 08/7

Solutions to the thermospheric tidal equations are described that define the extensions into the thermosphere of normalized wind and temperature structures associated with the (2,2), (2,3), (2,4), and (2,5) semidiurnal propagating tidal modes. The degree of alteration of vertical structures with latitude, and the change in horizontal shapes with height, corresponding to semidiurnal oscillations in northerly, westerly, and vertical velocity, and to temperature in the thermosphere are examined and implications to modeling the thermosphere are discussed. Extensive figures and tables covering the 80-400 km altitude region for five levels of solar activity at 6 deg latitude increments are provided for potential users. The structures can be used to extend meteor wind (80-100 km) and partial reflection drift (60-100 km) measurements to above 100 km for consistency checks with tidal winds and temperatures from Thomson scatter measurements at possibly different latitudes, or to simultaneously fit data covering these height regions for modeling purposes. Author

N83-26340# Air Force Geophysics Lab., Hanscom AFB, Mass. Space Physics Div.
SUPPLEMENTAL SUMMARY OF CUTOFF RIGIDITIES CALCULATED USING THE INTERNATIONAL GEOMAGNETIC REFERENCE FIELD FOR VARIOUS EPOCHS Interim Report
M. A. Shea and D. F. Smart 1 Nov. 1983 61 p refs
(AD-A126266; AFGL-TR-82-0320; ERP-802) Avail: NTIS HC A04/MF A01 CSCL 08/7

Tables of cosmic-ray cutoff rigidities using the trajectory-tracing technique are given for three epochs of the geomagnetic field. These values have been determined utilizing the International Geomagnetic Reference Field with time derivatives applied so that the coefficients for the field model are appropriate for the following epochs: 1965.0, 1970.0, and 1975.0. Each table includes the geographic coordinates and L value of each location together with the main cutoff rigidity, the Stormer cutoff rigidity, and the effective cutoff rigidity. The altitude for which each set of values was calculated is also given. Tables for both vertical and non-vertical directions are included. These cutoff rigidity values are supplemental to those published in previous AFGL reports. In addition, minor corrections to previously published values are also included. Author

N83-26341# Air Force Geophysics Lab., Hanscom AFB, Mass. Space Physics Div.
COMPARISON OF DATA FROM THE LOW ENERGY ELECTROSTATIC ANALYZERS ON SATELLITE P78-1 Interim Report
Roger P. Vancour 19 Aug. 1982 11 p refs
(AD-A125706; AFGL-TR-82-0236; ERP-790) Avail: NTIS HC A02/MF A01 CSCL 08/7

Air Force satellite P78-1 has aboard, on the wheel section, two detectors each consisting of a low energy and a high energy electron electrostatic analyzer. The low energy analyzer collects electrons in the energy range of 50 eV to 1 keV and the high energy analyzer collects electrons in the energy range of 1 keV to 20 keV. The two detectors were placed 90 deg apart on the wheel section of the satellite. The leading detector in the wheel's rotation is denoted as Detector 1. Counts of low energy electrons made by the low energy analyzers on board the satellite do not agree, but are corrected so that all data are usable. Multiplying the readings of the low energy analyzer Detector 1 by a factor of 1.64 brings them into agreement with counts from the other low energy analyzer and the two high energy analyzers. Three different comparisons of data from the four analyzers were used to derive the correction factor. Author

N83-26342# Air Force Geophysics Lab., Hanscom AFB, Mass. Meteorology Div.
ATLAS OF NORTHERN HEMISPHERE DENSITY BETWEEN 30 AND 60 km Interim Report
Arthur J. Kantor 29 Sep. 1983 51 p refs
(AD-A125987; AFGL-TR-82-0282; ERP-797) Avail: NTIS HC A04/MF A01 CSCL 08/11

Mean seasonal density charts for the Northern hemisphere for 5-km increments of altitude between 30 and 60 km are presented, along with estimates of the day-to-day variations around the mean seasonal values. This meets the need for a climatology of atmospheric density at constant altitudes above radiosonde levels. These charts are based on compilations of data from TIROS operational vertical sounders with meteorological rocketsonde observations to produce once-weekly analyses of height and temperature fields for the Northern Hemisphere at the 5, 2, 1, and 0.4 mb levels for the period July 1976 through April 1980. GRA

N83-26343# Atmospheric Radiation Consultants, Acton, Mass. Optical Physics Div.
TESTS OF AN INVERSION ALGORITHM FOR SPECTRALLY RESOLVED LIMB RADIANCE PROFILES Interim Report
A. S. Zachor and R. D. Sharma (AFGL, Hanscom AFB, Mass.) 28 Sep. 1982 20 p refs
(Contract F19628-81-C-0140)
(AD-A126335; AFGL-TR-82-0280; PSRP-658) Avail: NTIS HC A02/MF A01 CSCL 08/11

Tests were performed on a recursive algorithm that recovers vertical distributions of concentrations and temperature by inversion of spectrally resolved IR limb radiance profiles. The tests, which used synthetic data with added noise, established that the method can recover sharply peaked concentration profiles. The study results also give an indication of the spectral signal-to-noise requirements of the method. Author

N83-26344# Air Force Geophysics Lab., Hanscom AFB, Mass. Space Physics Div.
MAGNETOSPHERIC AND HIGH-LATITUDE IONOSPHERIC ELECTRODYNAMICS Interim Report
William J. Burke, David A. Hardy, and Roger P. Vancour 13 Apr. 1982 80 p refs
(AD-A125884; AFGL-TR-82-0131; AFSG-439) Avail: NTIS HC A05/MF A01 CSCL 08/11

An introductory overview of electrodynamic interactions between the magnetosphere and ionosphere is given. The viscous interaction and magnetic merging models for driving convection are described. The notion of adiabatic heating as a natural

consequence of convection is introduced, in conjunction with a quasi-empirical model for the magnetospheric potential. Observations of electrodynamic quantities taken in the topside ionosphere in the polar cap and auroral oval are discussed. GRA

N83-26345# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A REVIEW AND COMPARISON OF LIGHTNING RETURN STROKE MODELS USING EXPERIMENTAL DATA M.S. Thesis
Shad M. Hanif Dec. 1982 182 p refs
(AD-A124680; AFIT/GE/EE/82D-61) Avail: NTIS HC A09/MF A01 CSCL 12/1

Over the last three decades many lightning return stroke models have been proposed to predict the current pulse of the return stroke as it propagates in the channel. These models were mainly proposed by trying to solve the inverse problem of suggesting the current in the channel which will give the experimental measurement of the electromagnetic (EM) fields on the ground. Due to the lack of airborne data, the validity of these models as a function of height have not been verified. In this thesis we provide a discussion of all the significant return stroke models and their credibility as a function of height by comparing their EM fields with recent acquired airborne lightning data. The equations to compute the electric and magnetic fields in space due to a vertical channel are also derived. The last part of the thesis is related to the comparison of these models. The predicted fields due to Master et al. were plotted and compared with the empirical results. Also, the Master et. al. model was modified for the channel current pulse propagation velocity and the channel current wave form. The plots due to these modifications are included and compared with the experimental data. GRA

N83-26346# Purdue Univ., Lafayette, Ind. School of Electrical Engineering.
A SYNTACTIC APPROACH AND VISI ARCHITECTURES FOR SEISMIC SIGNAL
Hsi-Ho Liu and K. S. Fu Jan. 1983 217 p refs
(Contract N00014-79-C-0574; Grant NSF ECS-80-16580)
(AD-A124398) Avail: NTIS HC A10/MF A01 CSCL 08/11

Syntactic pattern recognition has been applied to seismic classification in this study. Its performance is better than many existing statistical approaches. VLSI architectures for syntactic seismic recognition are also proposed which take advantage of parallel processing and pipelining so that a constant time complexity is attainable when processing large amount of data. Application of syntactic pattern recognition to damage assessment is also proposed and demonstrated on a set of experimental data. Seismic waveforms are represented by strings of primitives, i.e., sentences, in this study. String-to-string similarity measures based on both distance and likelihood concepts are discussed along with the symmetric property and the hierarchy. A fixed-length segmentation is used in the experiment. Encouraging results comparable to those of the best statistical approaches are obtained with only two very simple features, namely zero-crossing count and log energy. Primitives are automatically selected using a hierarchical clustering procedure and two decision criteria. Nearest-neighbor decision rule and finite-state error-correcting parsers are used for classification. For error-correcting parsing, finite-state grammars are first inferred from the training samples. These two approaches have same performance in the experiment, whereas the nearest-neighbor rule is faster in speed. GRA

N83-26347# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Geotechnical Lab.
CAVITY DETECTION AND DELINEATION RESEARCH. PART 1: MICROGRAVIMETRIC AND MAGNETIC SURVEYS: MEDFORD CAVE SITE, FLORIDA Technical Progress Report, May 1979 - Nov. 1980
Dwain K. Butler Mar. 1982 142 p refs
(DA Proj. 4A1-61102-AT-22)
(AD-A124574; WES/TR/GL-83-1-1) Avail: NTIS HC A07/MF A01 CSCL 08/7

This report reviews the scope of a research effort initiated in 1974 at the U.S. Army Engineer Waterways Experiment Station with the objectives of (a) assessing the state of the art in geophysical cavity detection and delineation methodology and (b) developing new methods and improving or adapting old methods for application to cavity detection and delineation. Two field test sites were selected: (a) the Medford Cave site with a relatively shallow (10- to 50-ft-deep) air-filled cavity system and (b) the Manatee Springs site with a deeper (approximately 100-ft-deep) water-filled cavity system. Results of field studies at the Medford Cave site are presented in this report: (a) the site geology, (b) the site topographic survey, (c) the site drilling program (boreholes for geophysical tests, for determination of a detailed geological cross section, and for verification of geophysical anomalies), (d) details of magnetic and microgravimetric surveys, and (e) correlation of geophysical results with known site geology. Qualitative interpretation guidelines using complementary geophysical techniques for site investigations in karst regions are presented. Including the results of electrical resistivity surveys conducted at the Medford Cave site, the qualitative guidelines are applied to four profile lines, and drilling locations are indicated on the profile plots of gravity, magnetic, and electrical resistivity data. Borehole logs are then presented for comparison with the predictions of the qualitative interpretation guidelines. GRA

N83-26348# Army Engineer Topographic Labs., Fort Belvoir, Va. Center for Geodesy.
METHODS FOR CALCULATING ATMOSPHERIC REFRACTION AND IT PERTURBATION
Eugene A. Margerum Aug. 1982 27 p refs
(DA Proj. 4A1-61102-B-52C)
(AD-A123802; ETL-0299) Avail: NTIS HC A03/MF A01 CSCL 04/1

Equations for tracing rays through the atmosphere in spherical coordinates are developed including lateral refraction effects. The spherically symmetrical case is considered in greater detail and equations for the error in altitude angle are obtained. Perturbation analysis is also performed to obtain the deviations in the refraction error due to differences in some standard atmospheric profile and the actual atmospheric profile. In addition, numerical expressions for evaluating the integrals are given, and some simple standard atmospheric models are discussed. GRA

N83-26349# SRI International Corp., Menlo Park, Calif.
CHATANIKA RADAR MEASUREMENTS OF THE CONTINUOUS AURORA Final Report, 26 Jan. 1981 - 30 Sep. 1982
Robert M. Robinson Hanscom AFB, Mass. AFGL Oct. 1982 37 p refs
(Contract F19628-81-K-0037; AF Proj. 4643; SRI Proj. 2734)
(AD-A124023; AFGL-TR-82-0297) Avail: NTIS HC A03/MF A01 CSCL 04/1

Chatanika radar measurements were made of the continuous aurora. Four instrumented sounding rockets were launched into the continuous aurora. The radar provided simultaneous measurements of electron density, electric fields, and ion and electron temperatures. The peak E-region densities were between 1 and 2 to the 5th power cu cm at altitudes of 120 to 125 km. The electric field varied between 30 and 50 mV/m. The ion and electron temperatures suggest enhancement from Joule heating. This heating may have caused a higher-than-average amount of molecular ions relative to 0(x). The ionization in the continuous aurora was produced by precipitation electrons with average energies of about 2 keV and fluxes of 0.5 to 1.5 erg/sq cm - s. These electrons originated from a Maxwellian source in the plasma sheet with a density of 0.4 cu cm and temperatures varying between 0.8 and 1.6 keV. The radar measurements were reasonably consistent with data from several rocket-borne instruments. GRA

N83-26350# Scripps Institution of Oceanography, La Jolla, Calif. Visibilty Lab.
AN ANALYSIS OF INFRARED AND VISIBLE ATMOSPHERIC EXTINCTION MEASUREMENTS IN EUROPE Interim Report
Janet E. Shields Jun. 1981 38 p refs

(Contract F19628-78-C-0200; AF Proj. 7670)
(AD-A123999; AFGL-TR-81-0251; SIO-REF-82-4; SR-18) Avail: NTIS HC A03/MF A01 CSCL 04/2

This report discusses an analysis of infrared (3-5 and 8-12 micrometers) and visible extinctions recorded in the Netherlands over three 3-month seasons. The data, recorded at hourly intervals during this period, were gathered as a part of the OPAQUE program. They are preliminary releases data. It was found that the infrared aerosol extinctions could effectively be sorted into a clear to haze category and a mist to fog category. Two observations were required to determine the appropriate category: the visual extinction and the relative humidity. The use of either parameter alone yielded a much less effective categorization. As a result of this work, one may suggest two primary future avenues of investigation. First, interrogate the remaining OPAQUE data to determine the distribution and persistence of the infrared aerosol extinctions in the mist at other locations. Secondly, begin an experimental study to determine the feasibility of detecting large water droplet formation and thus the high infrared aerosol extinctions using measurements such as blue/red scattering ratios. The experimental approach would be to explore measurement techniques which are operationally feasible and which are theoretically expected to be effective in detecting large water droplet formation and thus high infrared aerosol extinctions. GRA

N83-26351# D'Appolonia (E.) Consulting Engineers, Inc., Pittsburgh, Pa.
FIELD TESTING OF GEOPHYSICAL TECHNIQUES Final Report, Dec. 1980 - Nov. 1981
Robert L. Costello Nov. 1981 63 p refs
(Contract DAAK11-80-C-0029)
(AD-A123996; DRXTH-TE-CR-81120; REPT-79-658-D2) Avail: NTIS HC A04/MF A01 CSCL 13/2

This report presents the results of the Phase II effort to field test geophysical techniques identified during Phase I as being potentially useful for shallow geologic and aquifer analysis. Included in the report is a geologic and physiographic description of the test site and a summary of the field plan. Following is a discussion of field operations and procedures, data processing, results, and a summary which considers the effectiveness of the tested techniques and presents recommendations. GRA

N83-26352# California Univ., Davis. Dept. of Civil Engineering.
NUMERICAL IMPLICATION OF THE COHESIVE SOIL BOUNDING SURFACE PLASTICITY MODEL, VOLUME 1 Report, Apr. - Nov. 1982
Leonard R. Herrmann, Jay S. DeNatale, Yannis F. Dafalias, and Wern Ping Chen Feb. 1983 118 p refs
(Contract N62474-82-C-8276)
(AD-A124866; NCEL-CR-83.010) Avail: NTIS HC A06/MF A01 CSCL 08/13

The results of a study of various numerical means for implementing the bounding surface plasticity model for cohesive soils is presented. A comparison is made of the computational efficiency, robustness, and ease of implementation of the competing methods. The comparisons are made on the basis of solutions to three representative geotechnical engineering problems. A very brief description of a computer-aided automated calibration procedure is given along with instructions for using the resulting computer code. An example calibration is reported for a particular cohesive soil. Author (GRA)

N83-26353# Fenix and Scisson, Inc., Mercury, Nev.
GEOLOGIC, GEOPHYSICAL, AND IN-SITU STRESS INVESTIGATIONS IN THE VICINITY OF THE DINING CAR CHIMNEY, DINING CAR/HYBLA GOLD DRIFTS, NEVADA TEST SITE
D. R. Townsend, M. J. Baldwin, R. D. Carroll (Geological Survey, Denver, Colo.), W. L. Ellis (Geological Survey, Denver, Colo.), and J. E. Magner (Geological Survey, Denver, Colo.) 1982 148 p refs
(Contract DE-AI08-76DP-00474)
(DE82-012239; USGS-OFR-82-137) Avail: NTIS HC A07/MF A01

The geologic, geophysical, and in situ stress data gathered in the course of mining and drilling in the Hybla Gold/Dining Car region is described. These investigations confirm several observations reported for the Rainier event, i.e., a zone of microfailure observable in thin section and in physical properties exists adjacent to the chimney. In addition, however, a number of investigations add information to the understanding of effects near the detonation point. Shear waves were found to be highly diagnostic in the microcracked zone near the chimney as well as zones of failure at greater range not discernible as well as zones of failure at greater range not discernible by other techniques. Extensive in situ stress measurements made by the hydrofracture and overcore techniques indicate changes in the orientation and magnitude of the pre-Dining Car stress field. The hydrofracture technique further suggests pronounced gradients in minimum stress magnitudes over short distances at some locations in the postshot stress regime. DOE

N83-26354# Gifford (F. A.), Oak Ridge, Tenn.
THE RANDOM-FORCE METHOD APPLIED TO CALCULATING SHORT-RANGE ATMOSPHERIC DIFFUSION
F. A. Gifford Los Alamos, N. Mex. LASL Dec. 1982 27 p refs
(Contract W-7405-eng-36)
(DE83-005605; LA-9583-MS) Avail: NTIS HC A03/MF A01

The random-force equation, a simplified, stochastic, Lagrangian equation for the lateral component of the motion of a diffusing air particle, is applied to the analysis of short-range, short-time averaged, horizontal atmospheric diffusion data. The velocity autocovariance and the velocity variance of the diffusing particle are derived and found to vary with the diffusion time, t. The normalized velocity autocorrelation function formed from these quantities is found to be a stationary exponential function of lag time. All these particle statistics, as well as the root mean squarre displacement of the particle about its mean position, i.e., the instantaneous plume spreading, depend on three atmospheric flow parameters: the total turbulent energy; the Lagrangian integral time scale; and the initial velocity of the particle at the source point. Atmospheric turbulance motions influence the shape and concentration patterns of diffusing plumes in the planetary boundary layer. The controlling role of tropospheric, turbulent, kinetic-energy transfer in this process is briefly discussed. DOE

N83-26355# Centre de Recherches en Physique de l'Environnement, Issy-les-Moulineaux (France).
ACTIVITIES REPORT IN TERRESTRIAL AND ENVIRONMENTAL PHYSICS Annual Report, 1981 [RAPPORT D'ACTIVITE CRPE POUR L'ANNEE 1981]
Jul. 1982 118 p refs In FRENCH Original contains color illustrations
(CRPE-NT-115) Avail: NTIS HC A06/MF A01

The troposphere and ground limit conditions; propagation; the physicochemical and dynamic aspects of the middle atmosphere; ionized atmosphere electrodynamics; planetary and terrestial electromagnetic radiation; and plasma resonance were investigated. Soil-atmosphere exchanges and energy exchanges in the lower troposphere were studied. Cloud convection; propagation in the presence of hydrometeors and in clear air; the dynamics of the upper mesosphere and thermosphere; and the photochemistry of the mesosphere were examined. The solar wind-magnetosphere and ionospheric dynamos were observed. Magnetospheric plasma energy transfer; plasma layers; high frequency electrostatic waves and planetary radioelectric radiation were investigated.
Author (ESA)

N83-26356# Fondazione Ugo Bordoni, Rome (Italy).
ANALYSIS OF THE SOLAR RADIATION CHARACTERISTICS AT ADRANO [ANALISI DELLE CARATTERISTICHE DELLA RADIAZIONE SOLARE AT ADRANO]
Francesco Barbaliscia and Alfredo Lavagnini (Ist. di Fisica dell'Atmosfera, Rome) May 1982 65 p refs In ITALIAN Sponsored by Ente Nazionale per l'Energia Electricca
(FUB-12-1982) Avail: NTIS HC A04/MF A01

The distribution functions of solar radiation were determined

using both a 30 sec base and a 10 to 60 min base. The data will be used for the design of a solar generator system at Adrano (Italy). Cumulative solar radiation by month, season and year was determined. The short and long term variabilities are discussed. It is shown that the measurements carried out on a 10 min base are practically equivalent to those from a 60 min base in determining the distribution function, while the shorter term measurements are not entirely equivalent. Author (ESA)

N83-26357# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
CAPABILITY OF SURFACE-BASED CLEAR-AIR DOPPLER RADAR FOR MONITORING REFRACTIVE INDEX GRADIENTS ALOFT
Earl E. Gossard, Russell B. Chadwick, Thomas Detman, and John Gaynor Sep. 1982 42 p refs
(Contract N66001-82-MP-0008)
(PB83-147140; NOAA-TM-ERL-WPL-102; NOAA-82121307) Avail: NTIS HC A03/MF A01 CSCL 04A

There is theoretical reason to believe that gradients of refractive index in stable elevated layers can be measured by surface-based, clear-air Doppler radars, sensing backscattered power (C sub n, sup 2), height gradients of the mean horizontal wind, and width of the Doppler velocity spectrum. In this paper the approach was to measure turbulent and mean quantities on the 300 m meteorological tower at the Boulder Atmospheric Observatory (BAO) at Erie, Colorado, USA and to examine the relationships between the turbulent and mean gradient quantities in order to evaluate assumptions for simplifying the kinetic energy and temperature balance equations. Radar measurements of Doppler spectral width were also made for comparison with tower-measured velocity spectra. Author (GRA)

N83-26358# National Oceanic and Atmospheric Administration, Boulder, Colo. Space Environment Lab.
VARIATIONS IN SOLAR UV SPECTRAL IRRADIANCE AND X-RAY FLUX
Richard F. Donnelly Sep. 1982 66 p refs
(PB83-137893; NOAA-TM-ERL-SEL-63; NOAA-82102702) Avail: NTIS HC A04/MF A01 CSCL 04A

Solar variations in the UV spectral irradiance are discussed with emphasis on the wavelengths important for producing or destroying ozone and heating the stratosphere. Short-term variations of days and weeks have now been well observed by the NIMBUS-7 and SME satellites. Progress in modeling the solar UV flux temporal variations based on solar spatial data is reviewed with emphasis on the role of modeling in intercomparing isolated measurements and for providing better UV estimates for past times than indices like the 10.7 cm solar radio flux or sunspot number can provide. Author (GRA)

N83-26359# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
EPOCS 1980: AIRCRAFT MEASUREMENTS OF RADIATION, TURBULENT TRANSPORT AND PROFILES IN THE ATMOSPHERIC AND OCEANIC BOUNDARY LAYERS OF THE TROPICAL EASTERN PACIFIC
V. E. Derr and R. L. Gunter Aug. 1982 177 p refs
(PB83-147553; NOAA-TM-ERL-WPL-101) Avail: NTIS HC A09/MF A01 CSCL 04A

The first of a series of three major sets of cloud observations were completed in the spring and early summer of 1980. These cloud observations were instituted under the auspices of NOAA's Equatorial Pacific Ocean Climate Study (EPOCS) and NOAA's Wave Propagation Laboratory. NOAA's WP-3D Orion aircraft was employed for the cloud radiation measurements. Additionally, meteorological and flight data were taken with standard instruments aboard the aircraft. This report deals with the objectives, procedures, instrumentation and data-collection/processing aspects of the 1980 Panama flights. Author (GRA)

N83-26360# Geological Survey, Woods Hole, Mass.
ENVIRONMENTAL GEOLOGIC STUDIES IN THE GEORGES BANK AREA, UNITED STATES NORTHEASTERN ATLANTIC CONTINENTAL MARGIN, 1978 - 1979 Final Report
Dennis W. O'Leary, ed. 1982 343 p refs
(Contracts DI-AA551-MU8-24; DI-AA551-MU9-4)
(PB83-144808; BLM/YL/ES-82/01) Avail: NTIS HC A15/MF A01 CSCL 08G

The reports present data acquired from 16 cruises between 1977 and 1979 as well as the results of the long-term tripod and current meter program begun in 1975 to study sediment transport. Program objectives are: To measure or estimate the rate of sediment mobility; to assess the seasonal and spatial variability of the major sediment transport mechanisms; to identify and map mass-movement features; to identify potentially disruptive features; and to assess geotechnical properties of near-surface sediment in selected tracts. Author (GRA)

N83-26361# Geological Survey, Golden, Colo.
UNITED STATES EARTHQUAKES, 1980
Carl W. Stover and Carl A. vonHake (NOAA) 1982 195 p refs
(PB83-147504; NOAA-82121401) Avail: NTIS HC A09/MF A01 CSCL 08K

This publication describes all earthquakes that were reported felt in the United States and nearby territories in 1980. The publication is composed of four major chapters: 'Earthquake Descriptions,' which includes a summary of macroseismic data reported for each earthquake and a chronological list of earthquakes by State; 'Network Operations,' which summarizes the results from local seismic networks; 'Miscellaneous Activities,' which contains information on crustal movement studies, tsunamis, and principal earthquakes of the world; and 'Strong-Motion Seismograph Data'. GRA

N83-26362# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Data and Information Service.
EARTHQUAKE HISTORY OF THE UNITED STATES, REVISED EDITION (THROUGH 1970), WITH SUPPLEMENT (1971-1980)
Jerry L. Coffman, ed., Carl A. vonHake, ed. (Geological Survey), and Carl W. Stover, ed. 1982 266 p refs Sponsored in part by Geology Survey
(PB83-147488; PUB-41-1-SUPPL) Avail: NTIS HC A11/MF A01 CSCL 08K

This publication is a history of the prominent earthquakes in the United States from historical times to 1980. For the purpose of listing and describing earthquakes, the United States has been divided into nine regions; (1) Northeastern Region, which includes New England and New York activity and observations of the principal earthquakes of eastern Canada; (2) Eastern Region, including the central Appalachian seismic region activity and the area near Charleston, S.C.; (3) Central Region, which consists of the area between the region just described and the Rocky Mountians; (4) Western Mountain Region, which includes all remaining states except those on the Pacific Coast; (5) Washington and Oregon; (6) Alaska; (7) Hawaii; (8) Puetro Rico; and (9) California and Western Nevada. This arrangement has been made chiefly with reference to the natural seismic divisions. GRA

N83-26363# Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.
DETERMINATION OF POTENTIAL DIRECT BEAM SOLAR IRRADIANCE Final Forest Service Research Paper
Merrill R. Kaufmann and James D. Weatherred Oct. 1982 30 p refs
(PB83-152496; FSRP-RM-242) Avail: NTIS HC A03/MF A01 CSCL 04A

Procedures are presented for calculating potential direct beam solar irradiance, corrected for latitude, azimuth and inclination of slope, date, and time of day. Equations are structured to permit the user to calculate instantaneous or total daily irradiance using total using total incoming shortwave irradiance or any selected portion of the solar spectrum. GRA

N83-26364# National Center for Atmospheric Research, Boulder, Colo.

REMOTE TROPOSPHERIC SO2: CLOUD TRANSPORT OF REACTIVE SULFUR EMISSIONS
Robert B. Chatfield 1982 244 p refs Sponsored in part by NSF
(PB83-148759; NCAR/CT-70) Avail: NTIS HC A11/MF A01 CSCL 04A

Model simulations suggest that reactive sulfur gases emitted from the land or ocean surface can produce upper tropospheric sulfur dioxide at the levels of 80 plus or minus 30 pptv measured over the remote oceans. Emissions of 20-40 Tg(S)/yr of dimenthyl sulfide, hydrogen sulfide, carbon disulfide, or more reactive species appear sufficient to explain this SO2. Previously published estimates based on traditional K(z) theory suggest 1/6 to 1/30 as much SO2 since they do not simulate the effects of rapid, but intermittent, convective transport. Further results indicate the importance of the possible transport, rainout, or reactions of peroxides; these appear to be as important as NOx concentrations in determining tropical OH radical concentrations. Implications of this work for the description of O3, NOx, SO2 and other species in the tropics and mid-latitudes are briefly mentioned. GRA

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N83-26365*# Dayton Univ., Ohio.
A FROST FORMATION MODEL AND ITS VALIDATION UNDER VARIOUS EXPERIMENTAL CONDITIONS Final Report
Mark A. Dietenberger Washington NASA Aug. 1982 69 p refs (Contract NAS8-33369)
(NASA-CR-3595; NAS 1.26:3595) Avail: NTIS HC A04/MF A01 CSCL 04B

A numerical model that was used to calculate the frost properties for all regimes of frost growth is described. In the first regime of frost growth, the initial frost density and thickness was modeled from the theories of crystal growth. The 'frost point' temperature was modeled as a linear interpolation between the dew point temperature and the fog point temperature, based upon the nucleating capability of the particular condensing surfaces. For a second regime of frost growth, the diffusion model was adopted with the following enhancements: the generalized correlation of the water frost thermal conductivity was applied to practically all water frost layers being careful to ensure that the calculated heat and mass transfer coefficients agreed with experimental measurements of the same coefficients. S.L.

N83-26366# Council for Scientific and Industrial Research, Pretoria (South Africa). Atmospheric Sciences Div.
PROPOSED TEMPERATURE PROFILE FOR THE TWO-DIMENSIONAL WIND FIELD MODEL Interim Report [VOORGESTELDE TEMPERATUURPROFIEL VIR DIE TWEEDIMENSIONELE WINDVELDMODEL]
O. L. Fourie Mar. 1982 11 p refs In AFRIKAANS
(CSIR-ATMOS/82/13) Avail: NTIS HC A02/MF A01

A temperature profile which can be used in solving determining equations of the two dimensional wind flow field model which predicts flow distribution and land-sea breeze, is proposed. The final form of the profile for energy distribution is presented.
Transl. by E.A.K.

N83-26367# Air Force Geophysics Lab., Hanscom AFB, Mass. Meteorology Div.
ANALYSIS AND SPECIFICATION OF SLANT WIND SHEAR Interim Report
H. Albert Brown 8 Nov. 1982 44 p refs
(AD-A125883; AFGL-TR-82-0366; ERP-810) Avail: NTIS HC A03/MF A01

Wind data collected at the Air Force Geophysics Laboratory (AFGL) Otis Weather Test Facility (WTF) for the period 28 March 1981 to 4 May 1981 have been analyzed to produce frequencies of occurrence of slant wind shear with respect to surface wind speed, time of day, vertical temperature gradient and wind shear direction differences. Slant wind shear (SWS) is a measurement that more closely approximates the shear encountered by an aircraft on takeoff or landing. It is computed as the wind shear between a higher level wind (in this study, 60 m) and the surface separated by a horizontal distance equivalent to that which an aircraft would traverse in descending or ascending that height.
B.W.

N83-26368# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
THE THEORY AND USE OF A RAYTRACING MODEL DEVELOPED AT USAFETAC
Michael D. Abel, John D. Mill, and C. Ted Linn Sep. 1982 102 p refs
(USAFETACV Proj. 1815)
(AD-A123280; AD-E850218; USAFETAC/TN-82/005) Avail: NTIS HC A06/MF A01 CSCL 04/2

This report describes the theory and use of the USAFETAC ray trace model RAYTRA. In this model atmopheric refraction is calculated using geometric optics and a single atmospheric profile. This program allows the user to define an arbitarary path geometry in the atmosphere anywhere from the Earth's surface to space. In its present form ionospheric effects are ignored. Its use is restricted to frequencies between 30 KHz (wavelength 10 km) and 1500 Hz (wavelength 0.2 m). For frequencies between 115 GHz (wavelenth 0.25 cm) and THz (wavelength 20m),the model results should be accepted with caution. The model itself is unique in its flexibility of application and special numerical techniques which enable it to compute types of ray paths which some models cannot handle. Furthermore, the code is structured in a modular, 'top down' fashion to allow for ease in modification and program maintenance. It has the capability to utilize user input atmospheric data or data from the USAFETAC archived weather tapes. Actual ray plotting is not provided. Instead, added information on the net atmospheric refractive effect such as range error is included in ouput along with a summary of the input parameters. GRA

N83-26369# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
CLIMATE OF REMOTE AREAS IN NORTH-CENTRAL ALASKA: 1975-1979 Summary Report
Richard K. Haugen Nov. 1982 118 p
(DA Proj. 4A1-61102-AT-24)
(AD-A123719; CRREL-82-35) Avail: NTIS HC A06/MF A01 CSCL 04/2

Air temperature, precipitation, and some ground surface temperatures predominantly from remote areas of central and northern Alaska are statistically and graphically summarized on a monthly basis for a five-year period (1975-79). The remote site data were obtained during the course of several CRREL investigations. To provide a more comprehensive coverage, these data are presented together with data obtained at National Weather Service stations in the area. The analysis is based on four climatic regions within the study area: The Continental Interior, the Brooks Range, the Arctic Foothills, and the Arctic Coastal Plain. A detailed analysis of coastal-inland summer air temperature gradients on the Arctic Coastal Plain is given. Station histories for the 1975-79 period and tabulated air and ground temperature statistics are included as appendices. Author (GRA)

N83-26370# Naval Research Lab., Washington, D.C. Atmospheric Physics Branch.
PROFILE-BULK METHOD FORMULAS FOR CALCULATING FLUX AND STABILITY IN THE MARINE ATMOSPHERIC SURFACE LAYER AND A SURVEY OF FIELD EXPERIMENTS Final Report
Theodore V. Blanc 30 Dec. 1982 19 p refs
(RR0330242)
(AD-A125327; AD-E000529; NRL-8647) Avail: NTIS HC A02/MF A01 CSCL 04/2

A comprehensive survey of profile flux experiments conducted in the marine atmospheric surface layer over the last 25 years is

presented with an extensive bibliography and the formulas for computing fluxes and stability. GRA

N83-26371# Texas Univ., Austin. Dept. of Civil Engineering.
COASTAL-WIND ASSESSMENT: INTERVIEWS AND OBSERVATIONS
Norman K. Wagner and Charles E. Meyers Aug. 1982 60 p refs
(Contract DE-AC06-76RL-01830)
(DE82-021376; PNL-3870) Avail: NTIS HC A04/MF A01

Delineation of wind characteristics in immediate section is discussed. Wind instruments were deployed in the study area, which includes Corpus Christi and Port Aransas, Texas, and the adjacent bays, inland waters, and the Gulf of Mexico. Interviews are summarized and compared with the data. The interview methodology, interviewing forms and techniques are described. The interview process has potential for use in the early phase of siting wind energy conversion systems. E.A.K.

N83-26372# Hawaii Univ., Honolulu. Dept. of Meteorology.
KAHUKU KITE WIND STUDY. 3: TURBULENCE ANALYSIS
P. A. Daniels Nov. 1982 52 p refs Sponsored in part by Bechtel Power Corp., Meteorology Research, Inc., and Windfarms Ltd.
(Grant DE-FG03-77ET-20184)
(DE83-006401; UHMET-82-03) Avail: NTIS HC A04/MF A01

One second recordings of wind speeds and directions from two kites flying at 30 and 90 meters and from a conventional vane/anemometer at 9 m were collected during over one hundred one-hour runs at eight sites in the Kahuku area on Oahu, Hawaii. A large wind turbine farm may be built in this area. Kite wind speeds were measured by a strain gauge and direction by two orthogonal potentiometers. The sites were located along two transects, one parallel to the prevailing trade winds from the ocean to the foothills area and the other in the foothill area perpendicular to the trades. The data were analyzed using three methods specifically developed for large wind turbine applications: the Ramsdell discrete gust model, the Huang-Fichtl discrete gust rise model and the NASA MOD-2 turbulence model. Additionally, autocorrelations were calculated. All four statistics indicated that the kites sampled turbulence significantly differently from the conventional anemometer, sensing much more small scale turbulence in the range that affects large wind turbines. DOE

N83-26373# Bradford Univ. (England). Postgraduate School of Electrical and Electronic Engineering.
DEVELOPMENT OF A CLIMATIC MAP OF RAINFALL ATTENUATION FOR EUROPE Final Report
P. A. Watson, M. Gunes, B. A. Potter, V. Sathiaseelan, and J. Leitao Paris ESA Jun. 1982 157 p refs
(Contract ESTEC-4162/79/NL-DG(SC))
(Rept-327; ESA-CR(P)-1707) Avail: NTIS HC A08/MF A01

The methodology for development of small scale maps of attenuation on Earth-space paths in the European region for the 11 to 14.5 GHz frequency range is described. The maps may be used for the planning of European regional satellite systems where a broad view of climatic features is required. A 5 min rain intensity data base with 627 stations was constructed. A method for predicting slant path attenuation based on a knowledge of the microphysical structure of rain storms as gained from dual polarization radar measurements is proposed. In regions with high rain intensity and high attenuation gradients the small scale maps should be used as a general guide only. However, the density of data points available for preparation of the maps is sufficient to allow the production of more accurate large scale maps for specific regions. Small scale attenuation maps are included for the OTS, ECS and L-SAT orbital positions, frequencies and polarizations. Predictions from the OTS maps checked against OTS data show excellent agreement. Author (ESA)

N83-26374# World Meteorological Organization, Geneva (Switzerland).
REPORTS ON MARINE SCIENCE AFFAIRS. REPORT 15: THE PREPARATION AND USE OF WEATHER MAPS BY MARINERS
1983 109 p refs
(WMO-595; ISBN-92-63-10595-2) Avail: NTIS MF A01; HC available at WMO, Geneva

A handbook of meteorology tailored to the needs of mariners is presented. The steps leading to the construction of a weather map and techniques for its analysis in case an immediate forecast is necessary are outlined. The role of shipping in the gathering of meteorological observations and the way in which observations are encoded, and the method of plotting and the drawing of isobars are introduced. Answers for different climatic regions to questions about weather systems, such as fronts, are provided. Ways in which weather maps can be used in differing conditions are discussed. Weather situations which are particularly dangerous to shipping, together with relevant forecasting rules are examined. Author (ESA)

N83-26375# World Meteorological Organization, Geneva (Switzerland).
WORLD WEATHER WATCH. CONSOLIDATED REPORT ON THE VOLUNTARY COOPERATION PROGRAM INCLUDING PROJECTS APPROVED FOR CIRCULATION IN 1982 Annual Report, 1982
Jan. 1983 198 p
(WMO-606; ISBN-92-63-10606-1) Avail: NTIS MF A01; HC available at WMO, Geneva

The status of the voluntary cooperation program (VCP) is reviewed, rules of the VCP are presented and VCP project implementation guidelines are given. Rules for the use of the VCP revolving fund are set out. Contributions to the VCP and implementation of VCP projects on 31 Dec 1982 are outlined. The VCP projects approved for circulation in 1982 (fellowships excluded) are listed. Projects approved for circulation in the period 1977 to 1981, revised in 1982 are summarized. Projects approved for circulation prior to 31 Dec 1976 are updated. Projects approved for circulation prior to 31 Dec 1982 and which are still valid are included. Author (ESA)

N83-26376# World Meteorological Organization, Geneva (Switzerland).
TWENTIETH ANNIVERSARY OF THE WORLD WEATHER WATCH: OPPORTUNITES AND OUTLOOK FOR AN IMPROVED WWW
David S. Johnson 1983 39 p refs
(WMO-608; ISBN-92-63-10608-8) Avail: NTIS MF A01; HC available at WMO, Geneva

The status of the global observing system, global data processing system and global telecommunication system is reviewed. Global numerical weather predictions are produced routinely for up to five-six and four-five days respectively in the northern and southern hemisphere extra-tropics and to two-four days in the tropics. The surface-based subsystem of the global observing system and associated telecommunications are far from full implementation, especially in Regions 2 and 3, in oceanic areas of the tropics and the southern hemisphere. Increased emphasis is needed at the regional and national levels on the provision of the data and products required to render more effective services to agriculture, transportation, resource management, weather and flood warnings and forecasts. Drifting buoys, automatic weather stations on commercial aircraft ships and land, all communicating their observations by satellite, and semiautomatic upper air sounding stations suitable for use on ships provide a feasible means to improve the surface based observation network. Author (ESA)

N83-26377# National Oceanographic Data Center, Washington, D. C.
MARINERS WEATHER LOG, VOLUME 26, NO. 2, SPRING 1982
1982 64 p
(PB83-147322; NOAA-82121303) Avail: NTIS HC A04/MF A01 CSCL 04B

Contents: Eastern North Pacific Tropical Cyclones, 1981;

Central North Pacific Tropical Cyclones, 1981; Ice observations on the Chesapeake Bay, 1977-1981; Sailing transatlantic. GRA

N83-26378# National Oceanic and Atmospheric Administration, Rockville, Md. Air Resources Labs.
THE GMCC ATMOSPHERIC TRAJECTORY PROGRAM
Joyce M. Harris (NOAA, Boulder, Colo.) Nov. 1982 35 p refs (PB83-146647; NOAA-TM-ERL-ARL-116; NOAA-82121305) Avail: NTIS HC A03/MF A01 CSCL 04B

Atmospheric trajectories can be used to gain a better understanding of typical air flow patterns around the observatories as Miller (1981a,b) has done with his climatologies of Borrow and Mauna Loa. When compared with measurements of trace constituents, trajectories can lead to insights about causes for variations in concentrations. The new version of the trajectory program described here is called 'GAMBIT' for Bridded Atmospheric Multilevel Backward Isobaric Trajectories. The trajectories produced are computed from analyzed winds along constant pressure surfaces. Backward trajectories can be computed for any receptor site in the Northern Hemisphere for up to four standard levels at a time. Author (GRA)

N83-26379# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
THUNDERSTORMS: A SOCIAL, SCIENTIFIC, AND TECHNOLOGICAL DOCUMENTARY. VOLUME 3: INSTRUMENTS AND TECHNIQUES FOR THUNDERSTORM OBSERVATION AND ANALYSIS
Edwin Kessler Apr. 1982 325 p refs Original contains color illustrations
(PB83-146076; NOAA-82102704) Avail: NTIS HC A14/MF A01 CSCL 04B

Station networks for storm observation; Tornado interception with mobile teams; Observations from instrumented aircraft; Photogrammetry of thunderstorms; Storm acoustics; infrasound from thunderstorms; Sferics and other electrical techniques for storm investigations; Observations and measurement of hailfall. Author (GRA)

N83-26380# National Oceanic and Atmospheric Administration, Boulder, Colo. Office of Weather Research and Modification.
AN ASSESSMENT OF SATELLITE RAIN ESTIMATES FOR LARGE-SCALE OPERATIONAL USE
Cecilia G. Griffith and John A. Augustine Oct. 1982 96 p refs (PB83-143131; NOAA-TM-ERL-OWRM-17; NOAA-82120307) Avail: NTIS HC A05/MF A01 CSCL 04B

The feasibility of using a satellite rain estimation technique to operationally estimate convective rainfall over large areas and for long time scales is investigated. The area is the central third of the United States from the Rocky Mountains to the Mississippi River and from South Dakota to central Texas. A month of rainfall (August 1979) was estimated from GOES infrared data. Comparisons with gage data for the month and for three individual days are made. The sensitivity of the technique to the frequency of the satellite data is discussed. One case of satellite rain estimation for a winter-time storm is also shown. GRA

N83-26381# National Academy of Sciences - National Research Council, Washington, D. C. Climate Board.
CARBON DIOXIDE AND CLIMATE: A SECOND ASSESSMENT Final Report
Jul. 1982 90 p refs
(Contract NA79RA-C-00104)
(PB83-141291; ISBN-0-309-03285-7; LC-82-12445) Avail: NTIS HC A05/MF A01 CSCL 04B

This study focuses on one aspect of CO2 emissions--estimation of the effect on climate of assumed increases in atmospheric CO2, primarily by means of numerical modeling of the climate system. Observations of the distributions of anthropogenic tracers other than carbon dioxide are examined to estimate the role of the world's oceans in the storage and transport of both CO2 and heat. Two studies which have concluded that the effect of increased CO2 on surface temperatures will be much less than estimated by the majority of the scientific community are discussed. GRA

N83-26382*# National Academy of Sciences - National Research Council, Washington, D. C. Geophysics Research Board.
SOLAR VARIABILITY, WEATHER, AND CLIMATE Final Report
Jul. 1982 116 p refs Sponsored by NASA, NOAA, Geological Survey, and ARPA
(Contract DE-FG02-80ER-10757; Grant NSF EAR-79-02458)
(NASA-CR-170352; NAS 1.26:170352; PB83-141283;
ISBN-0-309-03284-9; LC-82-7901) Avail: NTIS HC A06/MF A01 CSCL 04B

Advances in the understanding of possible effects of solar variations on weather and climate are most likely to emerge by addressing the subject in terms of fundamental physical principles of atmospheric sciences and solar-terrestrial physis. The limits of variability of solar inputs to the atmosphere and the depth in the atmosphere to which these variations have significant effects are determined. GRA

N83-26383# National Weather Service, Garden City, N.Y.
CONVERSION OF ALEMBICS WORKBINS TO TELETYPE FORMAT
Alan Blackburn Oct. 1982 13 p
(PB83-138313; NOAA-NWS-ERCP-5) Avail: NTIS HC A02/MF A01 CSCL 04B

The report contains a computer program which converts weather forecasts done by a terminal into a format that allows transmission over an asynchronous line. The program is written in FORTRAN and is designed to be run at a WSFO (Weather Service Forecast Office) with the foreground up. GRA

N83-26384# Texas Technological Univ., Lubbock. Inst. for Disaster Research.
TORNADO PHOTOGRAMMETRY: DETERMINATION OF WIND SPEEDS AND ASSESSMENT OF ERRORS M.S. Thesis. Final Report
Erik N. Rasmussen and Richard E. Peterson May 1982 64 p refs
(PB83-148627; TTU-IDR-65D) Avail: NTIS HC A04/MF A01 CSCL 04B

Photogrammetric techniques for analyzing tornado films are discussed. A formalism is developed for obtaining three-dimensional vortex motions, using the equation of continuity. A detailed discussion of possible errors includes a sample estimation of error magnitudes. Criteria for improvement of accuracy are set forth. The procedures are applied to film footage obtained by the Texas Tech University Storm Intercept Team during the 28 May 1980 Tulia Outbreak Storm. The horizontal and vertical cross-sections of tangential vertical and radial velocity yields are depicted. The estimates of errors from various sources led to a combined estimate of plus or minus 1.5 m/sec maximum. Author (GRA)

N83-26385# National Hurricane Center, Coral Gables, Fla.
ANNUAL DATA AND VERIFICATION TABULATION ATLANTIC TROPICAL CYCLONES, 1981
Nov. 1982 89 p refs
(PB83-146605; NOAA-TM-NWS-NHC-17) Avail: NTIS HC A05/MF A01 CSCL 04B

This is the eighth report of an annual series prepared by the National Hurricane Center (NHC) to provide a source of summarized data on Atlantic tropical cyclones. A summary of 1981 North Atlantic tropical and subtropical cyclone statistics is given in the report. Tracks of 1981 named storms as well as the November subtropical cyclone are shown. GRA

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N83-26386 British Aerospace Dynamics Group, Stevenage (England). Operational Requirements and Assessment Dept.

MARITIME ENVIRONMENT FOR THE EASTERN ATLANTIC
M. F. Booth Mar. 1982 46 p refs
(BAE-ST-26289) Avail: Issuing Activity

Visibility, precipitation, wind and cloud information is summarized for four areas in which UK forces, typically, may operate. The goal is to create a data base for electrooptical studies and modeling. Reports from ships at sea during the period 1961 to 1980 were used as the basis of visibility, precipitation and wind analysis. Reports on low cloud data were taken from six ocean weather ship reports. Definitions used in the ship reports are explained. Author (ESA)

N83-26387# Bertram Associates, Merrimack, N.H.
BATHYMETRY USING RADAR SIGNATURES ***Final Report***
C. L. Bertram 24 Mar. 1982 3 p
(Contract N00014-80-C-0450)
(AD-A123879) Avail: NTIS HC A02/MF A01 CSCL 08/10

The results obtained from the computer study on N00014-79-C-0160 indicated that a monocycle radar is applicable for the detection and identification of salt water wedges beneath fresh or brackish water and may be a useful tool for rapid, remote bathymetric measurements. Both laboratory and field tests were performed in an attempt to verify the computer results. The monocycle radars used consist of a pulse generator, a transmit/receive switch, an antenna and a receiver. These components were designed and fabricated by BTI on ONR contract N00014-80-C-0450. Laboratory tests using four special purpose coaxial lines verified the computer predictions. Field tests on the Connecticut River gave additional credence to the monocycle radar's ability to detect and identify a salt water wedge through both fresh water and naturally occurring layers of brackish water above the wedge. GRA

N83-26388# Naval Surface Weapons Center, Dahlgren, Va.
A ONE PARAMETER SOLUTION FOR SEAMOUNT SLOPE ***Final Report***
Walter J. Groeger Apr. 1982 72 p refs
(AD-A123986; NSWC/TR-82-91) Avail: NTIS HC A04/MF A01 CSCL 17/9

This report documents a computer program that augments an already operational, automatic seamount detector. Featured again are a digital filter, a modified roughness indicator, a physical model accounting for the effect of seamount gravitation on the sea surface, as well as the algorithm performing the actual model parameter estimation. While the existing seamount detector calculates the seamount peak submergence depth in the process of solving for the seamount base width, it is now assumed that the latter quantity may be readily deduced from the altimetry pattern. It becomes then possible to simultaneously compute the seamount peak depth and the slope angle. Included once more are an error analysis program segment and an appendix listing the numerical checkout data. Author (GRA)

N83-26389# Coastal Engineering Research Center, Fort Belvoir, Va.
THE DESIGN, DEVELOPMENT, AND EVALUATION OF A DIFFERENTIAL PRESSURE GAUGE DIRECTIONAL WAVE MONITOR
Kevin R. Bodge Oct. 1982 246 p refs Sponsored in part by the Exxon Corp.
(AD-A123950; CERC-MR-82-11) Avail: NTIS HC A11/MF A01 CSCL 08/3

This report discusses a directional wave gage consisting of one absolute and four differential pressure transducers. The differential pressure gage (DPG) development and field testing at the Coastal Engineering Research Center Field Research Facility pier at Duck, NC, is discussed and data analysis software programs presented. The development of the first nine Fourier directional coefficients from a four-gage pressure sensor array and the first eleven or twenty-one coefficients from a five gage DPG is discussed. Wave height, period, and directional information es estimated from DPG data is compared with estimates from radar and Baylor gauge data at the field evaluation site. Recommendations for future investigations and development of the DPG system are discussed. Author (GRA)

N83-26390# Science Applications, Inc., Raleigh, N.C.
SOUTH ATLANTIC OCS PHYSICAL OCEANOGRAPHY, YEAR 3. VOLUME 3: DATA PRODUCTS, PART 1 Final Progress Report, Jan. 1980 - Feb. 1981
Aug. 1982 257 p 4 Vol.
(Contract DI-AA851-CTO-12)
(PB83-144402; BLM/YL/ES-82/04-Vol-3-Pt-1) Avail: NTIS HC A12/MF A01; also available in sets of 4 reports as PB83-144378 CSCL 08J

The report is a compilation of data products associated with the Year III, South Atlantic Physical Oceanography Study. These data are organized to provide a concise reference for more in-depth presentations associated with material presented in the Technical Report, Volume 2, of this three-volume report. Part 1 includes data from the Blake Plateau hydrographic cruise (Sept., 1980), North Carolina Shelf hydrographic cruise (Sept., 1980), South Atlantic Bight subsurface current measurements (April, 1980).GRA

N83-26391# Science Applications, Inc., Raleigh, N.C.
SOUTH ATLANTIC OCS PHYSICAL OCEANOGRAPHY, YEAR 3. VOLUME 3: DATA PRODUCTS, PART 2 Final Progress Report, Jan. 1980 - Feb. 1981
Aug. 1982 372 p 3 Vol.
(Contract DI-AA851-CTO-12)
(PB83-144410; BLM/YL/ES-82/05-Vol-3-Pt-2) Avail: NTIS HC A16/MF A01; also available in sets of 4 reports as PB83-144378 CSCL 08J

The report part 2, includes data from Gulf Stream variability imagery (1976 - 1979), shelf wind prediction studies and additional data from hydrographic and current meter studies. GRA

N83-26392# National Weather Service, Silver Spring, Md. Techniques Development Lab.
A TIDE CLIMATOLOGY FOR BOSTON, MASSACHUSETTS
William S. Richardson, N. Arthus Pore, and David M. Feit Nov. 1982 73 p refs
(PB83-144196; NOAA-TM-NWS-TDL-71; NOAA-82120301) Avail: NTIS HC A04/MF A01 CSCL 08C

The Techniques Development Laboratory in cooperation with the Boston Weather Service Forecast Office has compiled a climatology of measured tide levels for Boston, Mass. Approximately 44 years (January 1936 through March 1980) of hourly tide levels were used to determine monthly and yearly frequencies of occurrence of tides above and below specified heights, at half-foot intervals by categories of duration. Also included are tabulations of heights and dates of highest and lowest annual tides and storm surges. Author (GRA)

N83-26393# Environmental Data and Information Service, Washington, D. C.
NODC/1981: NATIONAL OCEANOGRAPHIC DATA CENTER REPORT Annual Report
Oct. 1982 35 p
(PB83-145458; NOAA-82111502) Avail: NTIS HC A03/MF A01 CSCL 08J

In 1981 the National Oceanographic Data Center (NODC) observed the 20th anniversary of its formal dedication in January 1961 and began its third decade of service to the Nation. This annual report, therefore, represents more than just a review of NODC activities for the past year. In addition to these classical oceanographic observations that still form the core of NODC's global data bank, NODC can provide data from automated buoys, salinity-temperature-depth profilers, current meters, and other new electronic instruments, plus a full range of physical, chemical, and biological data from major environmental assessment projects operating on the U.S. Outer Continental Shelf. GRA

N83-26394# Geological Survey, Woods Hole, Mass.
ENVIRONMENTAL GEOLOGIC STUDIES IN THE MID-ATLANTIC OUTER CONTINENTAL SHELF AREA, RESULTS OF 1978-1979 FIELD SEASONS Final Report
James M. Robb 1982 311 p refs
(PB83-147934; BLM/YL/ES-82/09) Avail: NTIS HC A14/MF A01 CSCL 08C

Data collected by U.S. Geological Survey during 1978 and 1979 were used in this report. To summarize, this report discusses the following marine geologic environmental aspects of the Mid-Atlantic Outer Continental Shelf: ocean currents and sediment transport; sediment resuspension and mixing; bottom stability on the Continental Slope and factors that would lead to sediment movement; and descriptions of the middle and inner shelf.
Author (GRA)

N83-26395# National Oceanic and Atmospheric Administration, Seattle, Wash. Office of Marine Pollution Assessment.
PROCEEDINGS OF A POLLUTANT TRANSFER BY PARTICULATES WORKSHOP
Leal W. Kimrey and Robert E. Burns Sep. 1982 270 p refs Workshop held at Norfolk, Va., 19-21 Jan. 1982
(PB83-147868; NOAA-82112201) Avail: NTIS HC A12/MF A01 CSCL 08C

A workshop on Pollutant Transfer by particulates was held at the Center for Marine Studies, Old Dominion University, Norfolk, Va., on 19-21 January 1982. The purpose of the workshop was to review the current understanding of the role of particulates in marine pollution transfer, and to identify key, tractable questions and problems. Central to the discussions was the concept of the particle as a pollutant carrier. Emphasis was on the processes that govern the physical, chemical, and biological interactions between particulates and pollutants. Author (GRA)

N83-26396# Science Applications, Inc., Raleigh, N.C.
SOUTH ATLANTIC OCS PHYSICAL OCEANOGRAPHY, YEAR 3, VOLUME 2 Final Progress Report, Jan. 1980 - Feb. 1981
Aug. 1982 541 p refs 1 Vol.
(Contract DI-AA851-CTO-12)
(PB83-144394; BLM/YL/ES-82/03) Avail: NTIS HC A23/MF A01 CSCL 08C

Analyses of data completed during year 3 of the 5-year South Atlantic Physical Oceanography Study are presented. Topics of technical discussions include: Gulf Stream variability, wind and tide data, wind predictor studies, Blake Plateau hydrography results, North Carolina continental margin hydrography and subsurface currents and circulation in the South Atlantic Bight and 'Charleston Bump' region. GRA

N83-26397# Science Applications, Inc., Raleigh, N.C.
SOUTH ATLANTIC OCS PHYSICAL OCEANOGRAPHY, YEAR 3. VOLUME 1: EXECUTIVE SUMMARY Final Progress Report, Jan. 1980 - Feb. 1981
Aug. 1982 17 p 2 Vol.
(Contract DI-AA851-CTO-12)
(PB83-144386; BLM/YL/ES-82/02) Avail: NTIS HC A02/MF A01; also available in set of 4 reports PC E99, PB83-144378 CSCL 08E

The report provides a summary of field activities and analyses of physical oceanographic and meteorological data collected on the South Atlantic Bight/Outer Continental Shelf and Blake Plateau from January 1980 to February 1981, during Year 3 of the Physical Oceanographic Study. Project objectives, study participants, technical summaries and planned tasks for years 4 and 5 are provided. GRA

N83-26398# Edgerton, Germeshausen and Grier, Inc., Waltham, Mass.
INTERPRETATION OF THE PHYSICAL OCEANOGRAPHY OF GEORGES BANK. VOLUME 2: APPENDICES Final Report
Charles N. Flagg, Bruce A. Magnell, Daniel Frye, Jerome J. Cura, Scott E. McDowell, and Richard I. Scarlet Jul. 1982 254 p refs
(Contract DI-AA851-CT1-39)
(PB83-149062; EG/G-82-B4569-Vol-2; BLM/YL/ES-82/08-Vol-2)
Avail: NTIS HC A12/MF A01 CSCL 08E

The appendices include several short reports and studies in support of the basic technical report on Georges Bank physical oceanography. A three-dimensional hydrodynamic model to study interaction of tide and wind-driven flows is described. Tidal dynamics and low-frequency pressure oscillations are reviewed and analyzed. Statistical analysis and hindcasts of atmospheric forcing fields near Georges Bank are presented. Author (GRA)

N83-26399# Woods Hole Oceanographic Institution, Mass. Dept. of Physical Oceanography.
HYDROGRAPHIC STATION DATA OBTAINED IN THE EAST CHINA SEA, NOVEMBER 1981
R. Limeburner and R. C. Beardsley Oct. 1982 52 p ref Sponsored in part by the People's Republic of China
(Grants NA81AA-H-00008; NSF OCE-80-14941)
(PB83-137885; WHOI-82-44; NOAA-82102705) Avail: NTIS HC A04/MF A01 CSCL 08J

A hydrographic survey was made on November 18-23, 1981 on the People's Republic of China research vessel Shijian to measure the regional hydrographic in the East China Sea near the mouth of the Chang Jiang (Yangtze) River. The objectives of the hydrographic program were to document the spatial structure of the Chang Jiang discharge over the continental shelf and characterize the river's influence on the shelf water masses during a period of low river discharge. A summary of the hydrographic observations made during Cruise EC81-2 on the Shijian is presented in graphic form. Author (GRA)

N83-26120# Joint Publications Research Service, Arlington, Va.
PAST AND PRESENT OF NORTHERN SEA ROUTE
K. Chubakov, A. Arikaynen, and M. Shevelev *In its* USSR Rept.: Earth Sci., No. 25 (JPRS-83261) 14 Apr. 1983 p 6-16 Transl. into ENGLISH from Morsk. Flot (Moscow), no. 12, Dec. 1982 p 22-27, 29 (For primary document see N83-26119 15-42)
Avail: NTIS HC A06

N83-26121# Joint Publications Research Service, Arlington, Va.
SIX DECADES OF OCEAN RESEARCH
A. S. Monin and K. N. Fedorov *In its* USSR Rept.: Earth Sci., No. 25 (JPRS-83261) 14 Apr. 1983 p 17-25 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow), no. 6, Nov. - Dec. 1982 p 25-31 (For primary document see N83-26119 15-42)
Avail: NTIS HC A06

N83-26122# Joint Publications Research Service, Arlington, Va.
FLEET ADMIRAL S. GORSHKOV ON STUDY, USES OF OCEANS
S. Gorshkov *In its* USSR Rept.: Earth Sci., No. 25 (JPRS-83261) 14 Apr. 1983 p 34-48 refs Transl. into ENGLISH from Morsk. Sb. (Moscow), no. 12, Dec. 1982 p 16-26 (For primary document see N83-26119 15-42)
Avail: NTIS HC A06

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N83-26400# California Univ., Irvine, Dayton, Ohio.
PROCEEDINGS OF THE TWELFTH CONFERENCE ON ENVIRONMENTAL TOXICOLOGY
Apr. 1982 411 p refs Conf. held in Dayton, Ohio, 3-5 Nov. 1981
(Contract F33615-80-C-0512)
(AD-A115900; AFAMRL-TR-81-149) Avail: NTIS HC A16/MF A01 CSCL 06/3

Papers were presented in the area of animal modeling of carcinogenesis, sex-related factors influencing toxicity, use of experimental toxicologic data in estimating occupational hazards, use of physiologic kinetics in toxicology, and effects of toxic

substances on aquatic organisms. For individual titles, see N83-26401 through N83-26419.

N83-26401# Vermont Univ., Burlington. Dept. of Pathology.
MECHANISMS OF ASBESTOS-INDUCED CARCINOGENESIS IN HAMSTER TRACHEA
Brooke T. Mossman *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 13-23 refs (For primary document see N83-26400 15-51)
(PAPER-1) Avail: NTIS HC A16/MF A01 CSCL 06/3

In a recent survey, asbestos was ranked first on the list of carcinogens most hazardous to American industry. A linear dose-response relationship between the cumulative dosage of asbestos and the development of bronchogenic carcinoma was reported in miners, millers, and factory workers. A number of investigators have attempted to induce neoplasms in rodents after intratracheal instillation of asbestos or prolonged periods of exposure in inhalation chambers. The results of these experiments are difficult to interpret because of the small numbers of tumors and incomplete documentation of the types of malignancies observed. However, data show a striking increase in bronchogenic tumors when polycyclic aromatic hydrocarbons (PAH) (i.e., chemical carcinogens found in cigarette smoke) are administered at the same time as asbestos. These observations not only support the results of epidemiologic studies but also establish the critical role of PAH in tumor induction. Author

N83-26402# National Inst. of Environmental Health Sciences, Research Triangle Park, N. C. Lab. of Pulmonary Function and Toxicology.
CHEMICAL CARCINOGENESIS IN CULTURED RAT TRACHEAL EPITHELIUM
Vernon E. Steele and S. Balakrishna Pai *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 24-34 refs (For primary document see N83-26400 15-51)
(PAPER-2) Avail: NTIS HC A16/MF A01 CSCL 06/3

Respiratory tract epithelium is a critical site for cellular interaction with environmental contaminants. To understand the mechanisms of tumor induction in the target tissue, several experimental models were developed. The recent advances in the ability to culture respiratory tract epithelium have permitted the genesis of invitro studies which promise to elucidate many cellular and biochemical processes in carcinogenesis which were inaccessible in studies with whole animals. Author

N83-26403# Microbiological Associates, Inc., Bethesda, Md. Div. of Toxicology and Oncology.
A MOUSE LUNG CARCINOMA MODEL SYSTEM
Richard E. Kouri, Leonard H. Billups, William C. Hall, and Carol J. Henry *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 35-49 refs Sponsored in part by the Council for Tobacco Research (For primary document see N83-26400 15-51)
(PAPER-3) Avail: NTIS HC A16/MF A01 CSCL 06/3

The mouse presents several unique characteristics which make it a useful model to study the mechanism(s) for the induction of lung cancer. The advantages of using the mouse for such studies are: (1) availability of a large number of genetically diverse inbred strains; (2) economy of operation; (3) availability of colonies which are well defined in terms of their biological adventitious agents; and (4) availability of strains of mice in which susceptibility to lung cancer is genetically regulated. To further enhance the utility of the mouse system for carcinogenesis studies, more information is required on the type, location, biologic behavior and the degree of spontaneous occurrence of lung carcinomas. To this end, experiments were initiated in two strains of mice to determine the occurrence of spontaneous and chemically-induced lung tumors. Author

N83-26404# Medical Coll. of Ohio, Toledo. Dept. of Pathology.
STRAIN A MOUSE LUNG ADENOMA BIOASSAY FOR CHEMICAL CARCINOGENS
Gary D. Stoner, Elizabeth A. McCloskey, and Philip B. Conran *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 50-67 refs (For primary document see N83-26400 15-51)
(PAPER-4) Avail: NTIS HC A16/MF A01 CSCL 06/3

Strain A mice develop a high incidence of primary lung tumors during their lifetime. At 18 to 24 months of age, nearly 100% of strain A mice will have at least one primary tumor per lung and, occasionally, more than one tumor per lung. These tumors are commonly referred to as adenomas. The major determinant for the appearance of lung adenomas in strain A mice is the age of the animal. Older animals have a higher frequency of spontaneous lung tumors than young animals. The development of lung adenomas is not related to the sex of the animal although the males of strain A usually have a slightly higher incidence of both spontaneous adenomas and chemically-induced adenomas than females. There is no relation between the susceptibility of strain A mice to lung tumors and their susceptibility to spontaneous or induced neoplasms in other organs. Author

N83-26405# Medical Coll. of Ohio, Toledo. Dept. of Pathology.
METABOLISM OF BENZO(A)PYRENE IN CULTURED HUMAN BRONCHUS
Gary D. Stoner and F. Bernard Daniel *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 68-82 refs (For primary document see N83-26400 15-51)
(Grant EPA-807670)
(PAPER-5) Avail: NTIS HC A16/MF A01 CSCL 06/3

Lung cancer is a major cause of cancer deaths in many countries. Based on clinical, experimental, epidemiologic and autopsy data, cigarette smoking has been identified as the major risk factor in the development of lung cancer. The majority of lung cancers in man are bronchiogenic carcinomas which are thought to arise from a metaplastic squamous differentiation of the large bronchi. Polycyclic aromatic hydrocarbons, such as benzo(a)pyrene (PB), found in cigarette smoke and environmental pollutants, were associated with lung cancer in man. Since most chemical carcinogens have to be metabolically activated in the body before exerting their carcinogenicity, it is important to study the metabolic fate of benzo(a)pyrene in the human bronchus. Recent developments in the maintenance and growth of viable human epithelial tissues and cells in vitro have made possible the study of chemial carcinogenesis directly in human tissue. Author

N83-26406# Mississippi Univ., Jackson. Dept. of Pharmacology and Toxicology.
ORGANIZATIONAL EFFECTS OF HORMONES AND HORMONALLY-ACTIVE XENOBIOTICS ON POSTNATAL DEVELOPMENT c52
Coral A. Lamartiniere, Tracy Sloop, James Clark, Hugh A. Tilson, and George W. Lucier *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 96-121 refs (For primary document see N83-26400 15-51)
(PAPER-6) Avail: NTIS HC A16/MF A01 CSCL 06/3

Steroid hormones and xenobiotics were studied to determine their capability of exerting permanent irreversible modifications early in life that would result in alterations in endocrine secretion, behavior, reproduction or predispose the individual to cancer or to other biochemical insult. B.G.

N83-26407# Cincinnati Univ., Ohio. Dept. of Environmental Health.
MALE VS. FEMALE MEDIATED TERATOGENESIS c52
Jeanne M. Manson *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 122-139 refs (For primary document see N83-26400 15-51)
(PAPER-7) Avail: NTIS HC A16/MF A01 CSCL 06/3

Different types of reproductive dysfunction with exposure of males and females during different stages of the reproductive process were correlated. It is a well-established principle that teratogenic exposure of the pregnant female, and thus of the embryo, during the organogenesis period of development can lead to birth defects in the offspring. The outcome of this exposure paradigm, as well as the outcomes associated with exposure during other stages of the reproductive process that have received less experimental attention are discussed. Insult to the germ cells of

the male during spermatogenesis and to the female during oogenesis can also lead to reproductive dysfunction. The type of adverse outcome, however, is quite different from that occurring with embryonic exposure during the organogenesis period. An overview of this area will be given with the intent of focusing on those types of reproductive dysfunction that are most relevant to environmental exposure of men and women. Author

N83-26408# Chemical Industry Inst. of Toxicology, Research Triangle Park, N.C.
WHOLE ANIMAL SYSTEMS FOR MEASURING CHEMICALLY INDUCED GENOTOXICITY
Byron E. Butterworth and Jon C. Mirsalis *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 140-146 refs (For primary document see N83-26400 15-51)
(PAPER-8) Avail: NTIS HC A16/MF A01 CSCL 06/3

One step in the initiation of carcinogenesis involves damage to the DNA. Mutations in germ cell DNA are responsible for true genetic changes. Numerous techniques are now available to assess the genotoxic activity of a chemical in a variety of bacterial or mammalian cell culture assays such as chemically-induced mutagenesis, DNA damage and repair, cell transformation, and sister chromatid exchange. These assays were termed short-term tests for potential carcinogenicity because of a demonstrated correlation between carcinogenicity and activity in these assays for many classes of chemicals. Such systems are, however, severely limited in their predictive abilities because they do not reflect important species, strain, sex and organ specificities commonly observed in chemical carcinogenesis, and correlations retain a high degree of subjectivity. Author

N83-26409# Dow Chemical Co., Midland, Mich. Toxicology Research Lab.
TOXICITY, GENDER, AND NEUROBEHAVIORAL RESPONSES c53
Joel L. Mattsson *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 147-154 refs (For primary document see N83-26400 15-51)
(PAPER-9) Avail: NTIS HC A16/MF A01 CSCL 06/3

Beyond those hypothalamic and pituitary specializations that regulate reproduction, the gender-neurobiology literature leads one to the conclusion that although the brains of males and females are far more similar than they are different, there are also many subtle functional, anatomic, and physiologic differences. When neurobehavioral responses to chemicals differ significantly between the sexes, the difference is usually one of vector magnitude rather than vector direction. The followng examples illustrate the fact that gender can influence neurobehavioral responses to chemicals, although the mechanisms involved are not necessarily neural. Most of the studies reported are on rats, which are known to have gender-related differences in hepatic metabolism for many chemicals. Author

N83-26410# Air Force Occupational and Environmental Health Lab., Brooks AFB, Tex. Industrial Hygiene Branch.
AN INDUSTRIAL HYGIENIST'S VIEW: RELATIONSHIPS BETWEEN INDUSTRIAL HYGIENE SAMPLING, HUMAN EXPOSURE STANDARDS, AND EXPERIMENTAL TOXICOLOGY c52
James C. Rock *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 164-191 refs (For primary document see N83-26400 15-51)
(PAPER-11) Avail: NTIS HC A16/MF A01 CSCL 06/3

One industrial hygiene specialty is the evaluation of hazards posed by small concentrations of toxic materials in the workplace air. A variety of instruments are used to measure the average concentration over specified periods of time. These measured concentrations are then compared with exposure standards to judge the quality of the workplace. Much was written about proper statistical sampling strategies to insure that workplaces meet established exposure standards. Much less was written about whether or not exposure standards are created in such a fashion that a workplace which is in compliance is in fact as safe and healthful as described. This is an interdisciplinary question lying between industrial hygiene and environmental toxicology. The environmental toxicology community is provided with some food for thought from the perspective of one member of the industrial hygiene community. Author

N83-26411# Air Force Occupational and Environmental Health Lab., Brooks AFB, Tex.
EVALUATING HEALTH HAZARDS ASSOCIATED WITH AIRCRAFT FUEL CELL MAINTENANCE c52
Edward C. Bishop *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 192-202 ref (For primary document see N83-26400 15-51)
(PAPER-12) Avail: NTIS HC A16/MF A01 CSCL 06/3

Problems commonly encountered when toxicologic standards are applied to everyday worker exposures are demonstrated. The primary function of the industrial hygienist is to evaluate the workplace to insure a healthful environment for the worker. In general, this evaluation is accomplished by taking samples representative of the worker's environment, analyzing for contaminants of interest, and comparing the measured levels with appropriate standards. Control measures are instituted if contaminant levels are above the standard or some present fraction of the standard (NIOSH action level concept). Although the evaluation procedure may seem simple as described, it is a nontrivial task as demonstrated using the example of a recent evaluation of worker exposures during aircraft fuel cell maintenance. Author

N83-26412# Delaware Univ., Newark. Toxicology Research Lab.
PHARMACOKINETIC EVALUATIONS IN RELATION TO USE OF TOXICOLOGICAL DATA c52
John C. Ramsey *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 234-249 refs (For primary document see N83-26400 15-51)
(PAPER-15) Avail: NTIS HC A16/MF A01 CSCL 06/3

Dose-response and interspecies relationships, principles, and a hypothetical illustration are provided. The impact of the transition from linear to nonlinear pharmacokinetics upon the dose versus response curve is discussed. Author

N83-26413# Delaware Univ., Newark. Dept. of Chemical Engineering.
A PHYSIOLOGICALLY-BASED PHARMACOKINETIC MODEL FOR 2,5-HEXANEDIONE c52
Michael J. Angelo and Kenneth B. Bischoff *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 250-286 refs (For primary document see N83-26400 15-51)
(PAPER-16) Avail: NTIS HC A16/MF A01 CSCL 06/3

Toxicity of 2,5 hexanedione, single bolus dose studies, multiple bolus dose studies, constant intravenous infusion, a lumped reaction scheme for 2,5 hexanedione metabolism, model parameters, single dose exposure, urinary excretion, and multiple dose exposures are discussed. Author

N83-26414# National Inst. of Health, Bethesda, Md. Biomedical Engineering and Instrumentation Branch.
PHYSIOLOGICAL MODELING OF ENTERIC TRANSPORT c52
Peter M. Bungay, Robert L. Dedrick, and H. B. Matthews *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 287-298 refs (For primary document see N83-26400 15-51)
(PAPER-17) Avail: NTIS HC A16/MF A01 CSCL 06/3

A mathematical model of gut absorption and secretion for lipophilic agents based on a physiological pharmacokinetic approach to investigating enteric transport is developed. The findings from an analysis are summarized to illustrate the utility of the model. Author

N83-26415# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Toxic Hazards Div.
PHYSIOLOGICAL PHARMACOKINETIC MODELS FOR THE INHALATION OF GASES AND VAPORS c52
Melvin E. Andersen *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 299-316 refs (For primary document

see N83-26400 15-51)
(PAPER-18) Avail: NTIS HC A16/MF A01 CSCL 06/3

Metabolically inert gases and vapors; metabolized gases and vapors; and a preliminary physiological model of the uptake, distribution, metabolism and elimination of vapors are discussed.
Author

N83-26416# Proctor and Gamble Co., Cincinnati, Ohio. Biological Investigations Sect.
ASSESSING THE HAZARD OF CHEMICALS TO AQUATIC LIFE: A PERSPECTIVE ON THE STATE-OF-THE-ART c45
William E. Bishop *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 321-335 refs (For primary document see N83-26400 15-51)
(PAPER-19) Avail: NTIS HC A16/MF A01 CSCL 06/3

The basic principles involved in assessing the hazard of chemical substances to aquatic life are identified and discussed, and the conceptual framework that forms the basis of these specific assessment procedures is described. A perspective on some future research needs in the areas of aquatic toxicology and chemical hazard assessment is provided.
Author

N83-26417# SRI International Corp., Menlo Park, Calif.
BEHAVIOR OF HYDROCARBON FUELS IN AQUATIC SYSTEMS c45
J. H. Smith and J. C. Harper *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 336-353 (For primary document see N83-26400 15-51)
(PAPER-20) Avail: NTIS HC A16/MF A01 CSCL 06/3

Five high density fuels (RJ-4, RJ-5, RJ-6, JP-9, and JP-10) and three distillate fuels (JP-4, JP-5, and JP-8) were analyzed by capillary column gas chromatography (GC). The major components of the distillate fuels were identified by gas chromatography-mass spectrometry (GC-MS). The molecular weight of the isomers of the high density fuel components were also determined, but the structures of only a few components were assigned by comparing the GC retention times with authentic samples. The concentration and identify of the major water-soluble fuel components were also determined. The major aromatic components were benzene, the xylenes, 1,2,4-trimethylbenzene, naphthalene, and the methylnaphthalenes. The solubility of the high density fuel components was less than 0.02 mg/liter except for exo-tetrahydrodi(cyclopentadiene) which was less than 0.1 mg/liter. A correlation between the water solubility of the fuel component(s) and the fuel-water partition coefficient K sub fw was found, where K sub fw = 0.799 log S + 1.664 for JP-4, JP-5, and JP-8 at 20 C in deionized water at a fuel: water ratio of 1:1000.
Author

N83-26418# Environmental Protection Agency, Gulf Breeze, Fla. Environmental Research Lab.
MICROBIAL DEGRADATION OF XENOBIOTIC COMPOUNDS
Al W. Bourquin, Jim C. Spain, and P. H. Pritchard *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 354-369 refs (For primary document see N83-26400 15-51)
(PAPER-21; GB-CONTRIB-437) Avail: NTIS HC A16/MF A01 CSCL 06/3

Degradation of toxicants under conditions that maintain complexities of the natural environment and associated microorganisms was studied. Studies with (NTA) nitrilotriacetic acid demonstrated that this compound, normally biodegradable in freshwater, persists in estuarine environments. The studies illustrate the complex interactions in natural environments that complicate our understanding of biodegradation mechanisms. Interaction with environmental conditions or lack of genetic capabilities within an environment was demonstrated further when freshwater, but not saltwater, microbial populations were shown to adapt within several days to degrade p-nitrophenol rapidly.
Author

N83-26419# Army Medical Bioengineering Research and Development Lab., Fort Detrick, Md.
UTILIZATION OF AQUATIC ORGANISMS FOR CONTINUOUSLY MONITORING THE TOXICITY OF INDUSTRIAL WASTE EFFLUENTS c45
W. H. vanderSchalie *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 370-392 refs (For primary document see N83-26400 15-51)
(PAPER-22) Avail: NTIS HC A16/MF A01 CSCL 06/3

Use of aquatic organisms to monitor waste toxicity continuously is considered. The requirements for such a work approach are discussed, data from a field test of one system are described, and subsequent improvements in one type of monitoring system are detailed.
Author

N83-26420# Illinois Univ., Urbana. Dept. of Botany.
DEVELOPMENT AND FUNCTION OF MEMBRANE SYSTEMS IN PLANT TISSUE Annual Technical Progress Report, 15 Sep. 1981 - 15 Aug. 1982
J. B. Hanson 15 Aug. 1982 23 p refs
(Contract DE-AC02-76EV-00790)
(DE82-021134; DOE/EV-00790/T1) Avail: NTIS HC A02/MF A01

Ion transport mechanisms in corn roots and mitochondria are discussed. In In mitochondria it was found that only citrate and isocitrate are transported by the H citrate symporter. However, the in vivo function of this carrier remains in doubt because critrate does not appear to be an effective for corn mitochondria. Studies with roots were directed to why various types of injury or shock all result in temporary blockage of the H efflux pump in the plasmamembrane. It appears this may be due to an injury-mediated Ca(2) influx into the tissue, which by raising free Ca(2) in the cytosal activates calmodulin (CaM). In turn, the Ca.CaM complex appears to activate protein kinase, phosphorylating membrane proteins. It is possible that one of these phosphorylated proteins is responsible for inactivation of the H-ATPase.
DOE

N83-26421# Minnesota Univ., Minneapolis. Limnological Research Center.
EXPERIMENTS AND EXPERIENCES IN BIOMANIPULATION. STUDIES OF BIOLOGICAL WAYS TO REDUCE ALGAL ABUNDANCE AND ELIMINATE BLUE-GREENS
Joseph Shapiro, Bruce Forsberg (Inst. Macional de Amazonia), Vincent Lamarra (Utah State Univ., Logan), Gunilla Lindmark (Lund Univ.), Michael Lynch (Illinois Univ., Urbana), Eric Smeltzer (Dept. of Water Resources and Environmental Engineering, Montpelier, Vt.), and George Zoto (New England Aquarium, Boston) Dec. 1982 259 p refs
(Grant EPA-R-803870)
(PB83-148098; EPA-600/3-82/096) Avail: NTIS HC A12/MF A01 CSCL 08H

Studies have been done to find alternatives to restoring or managing lakes by controlling external sources of nutrients. The guiding princple has been to understand and use biological interactions with lakes. This process is called biomanipulation and it is clear from the results that algal abundance and type can be varied substantially by one or more of the following procedures: Elimination of benthivorous fish which recycle phosphorus from sediments; manipulations of algal populations by lowering pH, causing artifical circulation; and increasing abundance of larger herbivorous zooplankters by reducing predation on them.
Author (GRA)

N83-26422# Joint Publications Research Service, Arlington, Va.
USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 17, NO. 2, MARCH - APRIL 1983
O. G. Gazenko, ed. 13 May 1983 149 p refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 96 p
(JPRS-83467) Avail: NTIS HC A07

Space radiation and its hazards to the body are discussed. For individual titles, see N83-26423 through N83-26442.

N83-26423# Joint Publications Research Service, Arlington, Va.
ELECTROSTATIC SHIELDING AGAINST COSMIC RADIATION (CURRENT STATUS AND PROSPECTS) c52
T. Ya. Ryabova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May

1983 p 2-6 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 4-7 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

Conduction currents of the vacuum atmosphere near the spacecraft were measured in an electrostatic shielding and an electrostatic shielding module in electrostatic fields of about 10 to the 7th power Wt/m at a voltage of 3x10 to the 5th power V onboard Cosmos-605, 690, 732 and 936. The resultant conduction currents give evidence that the vacuum environment has high electroinsulation properties which contradicts the concepts derived from ground based studies. Using up to date high voltage devices, it appears possible to develop an efficient electrostatic shielding which will be of a low weight and a low power consumption.
Author

N83-26424# Joint Publications Research Service, Arlington, Va.
POSSIBLE DIRECTIONS OF REFINING CRITERIA OF RADIATION SAFETY OF SPACEFLIGHTS **c52**
Ye. Ye. Kovalev, V. M. Petrov, V. A. Sakovich, and M. A. Sychkov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 7-14 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 8-14 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

The possibility of characterizing space flight radiation safety is considered using a value which is integrated over the flight time, takes into account the radiation processes in an irradiated body and averages the probability of adverse radiobiological effects with respect to the distribution of solar proton flares of varying intensity. The proposed characteristic is compared with the current standards with reference to a hypothetic interplanetary flight. Author

N83-26425# Joint Publications Research Service, Arlington, Va.
DIET FOR HIGH-ALTITUDE MOUNTAIN CLIMBING **c54**
M. S. Belakovskiy, Ye. B. Gippenreyter, and A. S. Ushakov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 15-28 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 14-22 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

The experience accumulated in the Soviet Union and other countries concerning the arrangement of meals for mountaineers ascending the highest summits of the world is discussed. The discussion is made with reference to the reported data on human physiology at high altitudes. Physiological and biochemical investigations carried out at high altitudes and during experimental oxygen insufficiency indicate changes in the nutritional status and function of digestive organs under these conditions. Approaches to the optimization of nutrition of mountaineers at high altitudes are described. Author

N83-26426# Joint Publications Research Service, Arlington, Va.
EFFECT OF 140-DAY FLIGHT ON BLOOD AMINO ACID LEVELS IN COSMONAUTS **c52**
I. G. Popov and A. A. Latskevich *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 29-38 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 23-30 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

The results of studying 17 free amino acids in the plasma of the 140 day Salyut 6 crewmembers are presented. The measurements were carried out by means of a Hitachi KLA-3B amino acid analyzer. The data obtained give evidence that the dietary intake of amino acids before and during flight should be better controlled, the dietary content of amino acids should be enriched with certain amino acids (primarily methionine and cystine) and more adequately balanced. It is recommended to select space diets on an individual basis, taking into consideration anthropometric and metabolic characteristics of cosmonauts. Author

N83-26427# Joint Publications Research Service, Arlington, Va.
NUTRITIONAL VALUE OF FOOD IN TUBES FOR PILOTS AND COSMONAUTS **c54**
L. I. Kuznetsova, S. Yu. Gelfand, I. G. Popov, L. A. Gurova, and G. G. Akinshina *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 39-45 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 30-35 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

The nutritional value of new canned liquid and puree like foodstuffs in aluminum tubes for aircraft and spacecraft pilots was determined. The recipes and chemical composition of the food items are described. Particular attention is given to the content of amino acids, fatty acids and minerals. It is shown that canned foodstuffs are inhomogeneous in their chemical composition which is to be taken into consideration when they are used as menu items. Author

N83-26428# Joint Publications Research Service, Arlington, Va.
PHYSICAL STATUS AND BIOCHEMICAL PARAMETERS OF OBESE PILOTS AFTER IMPLEMENTATION OF PREVENTATIVE MEASURES **c52**
H. Lyson-Wojcechowska, M. Pendziwiatr, Z. Koter, and K. Kwarecki *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 46-49 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 35-37 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

The results of comprehensive examination (medical, anthropological, biochemical investigations and exercise tests) of obese pilots treated in specialized centers to make them lose weight are presented. Author

N83-26429# Joint Publications Research Service, Arlington, Va.
EFFECT OF SEVEN-DAY SPACEFLIGHT ON STRUCTURE AND FUNCTION OF HUMAN LOCOMOTOR SYSTEM **c52**
R. Hernandez-Korwo, I. B. Kozlovskaya, Yu. V. Kreydich, S. Martinez-Fernandez, A. S. Rakhmanov, E. Fernandez-Pone, and V. A. Minenko *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 50-58 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 37-44 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

The support properties of the foot arch in weightlessness induced motor changes and their prevention with the help of the Cupula Sand-501 device were studied. Comparison of the responses of the crewmembers shows that support simulation diminished the level of many of the adverse effects of zero g in the Cuban pilot who used the prophylactic device. It is suggested that the efficiency of the device is due to its activation of the system of support reactions. The mechanisms of the effects of weightlessness on the structure and function of the bones and joints in humans are discussed. Author

N83-26430# Joint Publications Research Service, Arlington, Va.
POSTURAL HEMODYNAMIC CHANGES FOLLOWING SHORT-TERM SPACEFLIGHTS **c52**
T. D. Vasilyeva, Kh. Kh. Yarullin, and V. I. Zhuyko *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 59-64 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 44-48 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

Variations in the pulse blood content and tone of cerebral vessels, vertebrobasilar system, lungs and legs during the antiorthostatic tests were examined rheographically in 14 cosmonauts after 8-day space flights. The results of adaptation of the vascular system to zero-g which included smaller changes in hemodynamic parameters of the hemispheres and vertebrobasilar

system during postflight tests were seen during the first days of the recovery period. Regional hemodynamic parameters returned to the preflight level within 3 to 14 days postflight. The vascular response to the head-down tilt at -15 and -30 deg was the most informative. This led to the recommendations concerning modifications of antiorthostatic tests to be used in the selection of space crewmenbers for short-term flights. Author

N83-26431# Joint Publications Research Service, Arlington, Va.
HUMAN VESTIBULAR REACTIONS TO GALVANIC STIMULATION OF LABYRINTHS c52
G. I. Gorgiladze, G. I. Samarin, and S. N. Rusanov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 65-71 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 48-52 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

The development of illusionary movements and oscillations of the total body mass center in response to labyrinthine stimulation by ascending and descending current was investigated in 37 healthy test subjects. The stimulation of each labyrinth separately or both labyrinths by the current of opposite direction caused illusionary sensations of tilts, turns and tumbles in various planes. When the test subjects were on the stabilographic platform, their total body mass center shifted toward the anode. Simultaneous stimulation of both labyrinths by the current of one direction produced qualitatively new reactions, such as illusionary movement and displacement of the mass center toward the sagittal plane. Author

N83-26432# Joint Publications Research Service, Arlington, Va.
HUMAN BLOOD BIOGENIC AMINES AND THEIR PRECURSORS IN ANTIORTHOSTATIC POSITION AND WITH INTAKE OF PHARMACOLOGICAL AGENTS FOR PREVENTION OF SEASICKNESS SYNDROME c52
N. A. Davydova, S. L. Ilina, and V. V. Sabayev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 72-77 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 53-56 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

The 6-hour exposure to head-down tilt at -15 deg was accompanied by an increased blood content of adrenaline and noradrenaline, thus indicating the activation of the sympathoadrenal system. The catecholamine concentration was shown to be proportional to the head-down tilt time. The exposure also led to an increase of the content of serotonin and left the content of 5-hydroxytryptophan, tryptophan, histamine and histidine unchanged. After administration of ephedrine and especially, ephedrine in combination with pipolphen the increase in the concentration of catecholamines and serotonin became significantly less pronounced. Author

N83-26433# Joint Publications Research Service, Arlington, Va.
RESULTS OF QUANTITATIVE CYTOLOGICAL ANALYSIS OF RAT THYMUS AFTER FLIGHTS IN BIOSATELLITES
Fedor Vasilyevich Sushkov, S. V. Rudneva, G. N. Durnova, and T. F. Ponomareva *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 78-84 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 56-61 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

The mitotic activity, destruction and volume of thymocytes were investigated on histological preparations of the thymus of rats flown onboard Cosmos-782 and Cosmos-936. The cytological data showed that immediately after touchdown large quantities of thymocytes of the cortical matter perished. The mitotic activity of the remaining undamaged thymocytes declined and returned to normal 9 hours after recovery. The rats that were centrifuged inflight (at 1 g) did not display a lower mitotic activity or noticeable destruction of thymocytes. Karyometric measurements demonstrated that the population of thymic lymphocytes was heterogeneous in the nuclear volume: it consisted of three peak classes of nuclear volumes. The variance curves of nuclear volumes of lymphocytes of the medullary matter were drastically shifted toward large numbers. An increase in the nuclei of thymocytes of the cortical matter in the flight rats was stable and persisted till R+25. Author

N83-26434# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF MORPHOLOGICAL AND FUNCTIONAL PROPERTIES OF RAT PERIPHERAL BLOOD AND BONE MARROW CELLS AFTER FLIGHT IN COSMOS-936 BIOSATELLITE
G. I. Kozinets, V. I. Korolkov, I. I. Britvan, I. A. Bykova, N. Ye. Spitsyna, N. N. Talelenova, V. A. Kondratyeva, and N. A. Chelnaya *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 85-94 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 61-65 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

Morphofunctional properties of peripheral blood cells of Cosmos-936 rats were examined, using morphological, interferometric and electron microscopic techniques. As follows from the morphological data, immediately after recovery the weightless rats showed symptoms of a stress reaction which disappeared by R+3. The centrifuged rats exhibited less expressed symptoms of this sort. The percentage of bone marrow cell distribution was shifted towards enhanced myelopoiesis and diminished erythropoiesis. By the end of the readaptation period the ratio of bone marrow cell composition returned to normal. Interferometric and electron microscopic examinations did not reveal any irreversible changes in the structure and function of cells that may be caused by zero-g. Author

N83-26435# Joint Publications Research Service, Arlington, Va.
ACTIVITY OF SOME ENZYMES IN RAT LIVER SUBCELLULAR FRACTIONS AFTER FLIGHT ABOARD COSMOS-1129 BIOSATELLITE
R. A. Tigranyan, Ye. G. Vetrova, S. Abraham, C. Lin, H. Klein, and C. Wolkmann *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 91-94 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 65-67 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

The activities of malate, isocitrate and lactate dehydrogenases were measured in the liver mitochondrial and cytoplasmatic fractions of rats flown for 18.5 days onboard Cosmos-1129. The activities of the oxidative enzymes, malate and isocitrate dehydrogenases, in the mitochondrial fraction and those of the glycolytic enzyme, lactate dehydrogenase, in the cytoplasmatic fraction were found to decrease. Author

N83-26436# Joint Publications Research Service, Arlington, Va.
EFFECT OF HYPOKINESIA ON VITAMIN D METABOLISM IN RATS
I. N. Sergeyev, Yu. P. Arkhapchev, V. B. Spirichev, A. S. Ushakov, M. S. Beiakovskiy, L. F. Linberg, N. V. Blazheyevich, S. V. Sokolova, and V. A. Yurkiv *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 95-103 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 68-73 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

The effect of short- (7 days) and long-term (28 days) hypokinesia on 25-oxycholecalciferol metabolism was investigated in rats that were fed diets containing adequate amounts of vitamin D, calcium and phosphorus. Eighteen hours before sacrifice the animals were injected 3H-25(OH)D3. 3H-metabolites of D3 formed in vivo were separated by high-performance liquid chromatography, and their concentrations in the serum, kidneys, intestinal mucosa and bones were measured. Long-term hypokinesia decreased the content of 3H-1,25(OH)2D3 and increased that of

3H-24,25(OH)2D3 in the serum and kidneys. The exposure diminished the content of both 3H-1,25(OH)2D3 and 3H-24,25(OH) 2D3 in the intestinal mucosa and bones and increased that of nonmetabolized 3H-25(OH)D3. The data obtained are indicative of a lower synthesis of 1,25(OH)2D3 and a higher synthesis of 24,25(OH)2D3 in the kidneys, as well as of a reduced binding of 24,25(OH)2D3 in the intestinal mucosa and bones in hypokinetic rats. Possible causes of variations in the biosynthesis of vitamin D active metabolites and their contribution to the disorders of calcium metabolism and bone density during hypokinesia are discussed. Author

N83-26437# Joint Publications Research Service, Arlington, Va.
HEMODYNAMICS OF PULMONARY CIRCULATION DURING PROLONGED HYPOKINESIA (ACCORDING TO RESULTS OF MORPHOLOGICAL INVESTIGATION)
V. I. Yakovleva *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 104-108 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 73-76 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

Data on pulmonary circulation of rats during prolonged hypokinesia (30 to 165 days) are presented. It was found that the hypokinetic exposure of 30 to 60 days produced venous and, in particular, capillary plethora associated with blood redistribution and pooling in the lungs. As the exposure continued, the plethora level decreased due to the development of compensatory-adaptive reactions in the lung vessels. For instance, on hypokinetic day 90 small arteries of the muscle type developed a spasm which accelerated circulation stabilization. By hypokinetic days 120-165 pulmonary circulation returned to normal due to the further development of compensatory adaptive mechanisms in lung vessels (tendency for hypertrophy of the media of small arteries and increase of its cross-sectional area). Author

N83-26438# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF TRACE CONTAMINANTS IN ATMOSPHERE FORMED BY HABITAT ENVIRONMENT OF THE CLOSED MAN-HIGHER PLANTS-LOWER PLANTS-MICROORGANISMS SYSTEM **c54**
T. V. Nolde, Yu. V. Pepelyayev, O. A. Sukhorukov, and Ye. Ya. Shepelev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 109-114 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 76-79 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

Trace contaminants in the air of a biological life support system which was continuously complicated were examined. Air samples were taken by cooled traps and analyzed by gas chromatography. Changes in the air of the biological life support system as a function of its structure were compared using Hamming distance and composition similarity measures. Matrices of the measures were obtained and a graph whose structure corresponded to changes in the biological life support system was constructed. During prolonged experiments trace contaminants remained relatively stable and changed when a mineralization component was attached. It is concluded that the composition and variations in the organic components of the atmosphere can be used as an integral indicator of the function of the biological life support system as a whole. Author

N83-26439# Joint Publications Research Service, Arlington, Va.
EFFECT OF PHYTONCIDES ON CEREBRAL CIRCULATION IN FLIGHT CONTROLLERS DURING PROFESSIONAL WORK **c52**
Ya. S. Leshchinskaya, N. M. Makarchuk, A. F. Lebeda, V. V. Krivenko, A. K. Sgibnev, and T. S. Bagatskaya *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 115-120 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 80-83 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

In order to optimize the environment in which flight controllers normally work, volatile phytoncides of brandy mint, lavender, and anise were used. After their 20-day application the health condition of the flight controllers improved. By the end of the working hours they felt less tired. Besides, as shown by the rheoencephalographic data, their cerebral circulation showed no abnormalities. The examinations carried out at the end of the first shift and at a high occupational load, when no phytoncides were used, showed that the REG-wave amplitude decreased and tonic tension of cerebral vessels (alpha, alpha/T, alpha/beta) increased; these changes are typical of fatigue. When the biologically active substances were employed, the changes were of the opposite pattern: adequately increased mental capacity, reactions which included a diminished tension of the vascular wall and a moderately increased blood content of the vessels. Author

N83-26440# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL APPROACH TO VALIDATION OF A COMBINED SANITATION METHOD FOR COSMONAUTS **c54**
S. N. Zaloguyev, A. N. Viktorov, V. Ya. Prokhorov, K. R. Tolovskaya, I. A. Parchinskaya, V. P. Gorshkov, K. V. Zarubina, M. M. Shinkareva, and T. Yu. Norkina *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 121-125 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 83-86 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

Efforts made by various authors to obtain the necessary result with respect to assanation by local application of various antimicrobial agents yielded rather limited and brief effects. The desired result was not achieved in cases where the carriers of pathogenic staphylococci were submitted to specific immunization with staphylococcal toxoid. On the basis of clinical experience and current conceptions of the pathogenesis of St. aureus carrier state in health subjects, studies were pursued to explore the possibility of creating the necessary conditions to eliminate pathogenic staphylococci from carriers by means of a combined treatment, which included agents for direct suppression of the existing microbial focus against the background of stimulating the immunity system. L.F.M.

N83-26441# Joint Publications Research Service, Arlington, Va.
PREDICTION AND IDENTIFICATION OF COSMIC SOLAR RADIATION FLUX AND SPECTRA **c92**
S. I. Avdyushin, N. K. Pereyaslova, P. M. Svidskiy, and A. B. Malyshev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 126-132 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 86-89 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

As a result of investigating the link between characteristics of cosmic solar radiation events and parameters of heliogeophysical phenomena that accompany a solar burst, several patterns were established, which served as the basis of forecasting methods. The method of concurrent examination of the set of heliogeophysical phenomena associated with a solar burst is used to solve forecasting problems. The data about solar activity, flux of penetrating radiation in the interplanetary environment and magnetosphere, as well as about the state of the interplanetary environment, which are needed for analysis, are provided by cosmic, stratospheric and ground-based equipment, which forms a regulation observation network of the radiation situation service. L.F.M.

N83-26442# Joint Publications Research Service, Arlington, Va.
STUDY OF PSYCHOPHYSIOLOGICAL DISTINCTIONS OF PRIMATES USING DELAYED REACTION TEST
I. P. Sheremet, G. S. Belkaniya, and N. F. Sofiakis *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 133-137 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow),

v. 17, no. 2, Mar. - Apr. 1983 p 90-92 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

The efficacy of teaching and training is largely determined by the characteristics of animals' higher nervous activity (HNA). Such elements of HNA as short-term and long-term memory, which correlate the most with the learning capacity of animals, are particularly important. In view of the need to screen monkeys for teaching them operator work following the program of preparations for an experiment aboard an artificial earth satellite, our aim was to search for and refine an objective psychophysiological test. The method of testing delayed reactions (DR), which is used extensively to assess intercentral relations in the central nervous system, effect of diverse factors on human and animal memory and experimental study of interaction between different forms of memory served as our basis. DR are a complex neuropsychological phenomenon and for this reason most studies deal with the reflex basis and neurophysiology of DR. Our purpose here was to adapt the method of testing DR to the test requirements, as well as to use the developed DR test to evaluate individual psychophysiological reactivity of monkeys. L.F.M.

N83-26443# Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES: BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 34
20 May 1983 130 p refs Transl. into ENGLISH from various Russian articles
(JPRS-83514) Avail: NTIS HC A07

Activities in the fields of biotechnology epidemiology, genetic engineering, laser effects, marine biology, medical demography, microbiology and pharmacology are discussed. Adaptation to polar environments and the electrical activity of the sympathetic nervous system are also discussed. The dynamics of microbial-cell dehydration in the air was studied. For individual titles, see N83-26444 through N83-26446.

N83-26444# Joint Publications Research Service, Arlington, Va.
DYNAMICS OF DEHYDRATION OF MICROBIAL CELLS IN AN AERODISPERSED STATE UNDER VARYING ATMOSPHERIC HUMIDITY
V. F. Konyukhov and L. A. Maltseva *In its* USSR Rept.: Life Sci.: Biomed. and Behavioral Sci., No. 34 (JPRS-83514) 20 May 1983 p 1-7 refs Transl. into ENGLISH from Zh. Mikrobiol. Epidemiodl. i Immunobiol. (Moscow), no. 9, Sep. 1981 p 62-66 (For primary document see N83-26443 15-51)
Avail: NTIS HC A07

The dynamics of microbial-cell dehydration in the air was studied. The influence of this process upon microbial-cell viability was also studied by using the nuclear magnetic resonance (NMR) method. B.W.

N83-26445# Joint Publications Research Service, Arlington, Va.
FORECASTING PSYCHOLOGICAL AND PHYSICAL PERFORMANCE UNDER STRESSFUL CONDITIONS **c53**
A. Aykaraliyev *In its* USSR Rept.: Life Sci.: Biomed. and Behavioral Sci., No. 34 (JPRS-83514) 20 May 1983 p 22-25 Transl. into ENGLISH from Sov. Kirg. (Frunze), 25 Jan. 1983 p 3 (For primary document see N83-26443 15-51)
Avail: NTIS HC A07

A comprehensive method is developed for forecasting the work capacity of man. It incorporates a determination of a whole series of physiolocial and biochemical parameters, an evaluation of the individual properties of the central nervous system and personality characteristics. The investigations demonstrated a high degree of correspondence between biochemical and physiological criteria characterizing the resistance of man to oxygen deficit. It was shown that interpersonal relationships in a most direct manner affect the work capacity of a group located for a long period under extreme conditions. B.W.

N83-26446# Joint Publications Research Service, Arlington, Va.
ELECTRICAL ACTIVITY OF THE SYMPATHETIC NERVOUS SYSTEM RECORDED ON SKIN SURFACE **c52**
V. I. Skok, L. V. Melnichenko, I. N. Remizov, S. L. Purnyn, and V. V. Gerzanich *In its* USSR Rept.: Life Sci.: Biomed. and Behavioral Sci., No. 34 (JPRS-83514) 20 May 1983 p 58-60 refs Transl. into ENGLISH from Dokl. Akad. Nauk Ukrainskoy SSR. Ser. B (Kiev), no. 12, Dec. 1982 p 69-71 (For primary document see N83-26443 15-51)
Avail: NTIS HC A07

The method is created for recording the natural electrical activity of human and animal sympathetic nerve fibers by skin-surface-electrodes. The activity was recorded, stored and averaged as synchronous with cardiac rhythm. The r wave of ecg was used to synchronize the averaging system. It is suggested that the record obtained is the averaged sum of the action potentials that spread in sympathetic fibers innervating the skeletal muscle vascoconstrictors. B.W.

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N83-26447* National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 245)
May 1983 103 p
(NASA-SP-7011(245); NAS 1.21:7011) Avail: NTIS HC $7.00 CSCL 06E

This bibliography lists 363 reports, articles and other documents introduced into the NASA scientific and technical information system in April 1983. Author

N83-26448*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EFFECT OF HYDRATION ON NITROGEN WASHOUT IN HUMAN SUBJECTS
James Waligora, David J. Horrigan, Jr., and Johnny Conkin (Technology, Inc., Houston, Tex.) May 1983 23 p refs
(NASA-TM-58254; S-525; NAS 1.15:58254) Avail: NTIS HC A02/MF A01 CSCL 06P

Five subjects were tested to assess the influence of drinking hypotonic water (distilled water) on whole body tissue nitrogen washout. During the test, the subjects breathed aviators' oxygen for three hours. Each subject performed two baseline nitrogen washouts in a two-week period. The third washout, in the third week, was done under a transient hydrated condition. This was accomplished by having the subjects drink 1.5 liters of hypotonic water 30 minutes before the washout. Five-minute plots of tissue nitrogen removal from the three separate washouts were analyzed to ascertain if the hydration technique had any effect. Our results clearly indicate that the hydration technique did not alter the tissue nitrogen washout characteristics to any degree over three hours. An increase in tissue nitrogen washout under a transient hydrated condition using hypotonic fluid was not demonstrated to be the mechanism responsible for the reported benefit of this technique in preventing Type I altitude decompression pain in man. Author

N83-26449# Naval Research Lab., Washington, D. C.
NEW MEASUREMENT TECHNIQUES USING TRACERS WITHIN LASER-PRODUCED PLASMAS
M. J. Herbst, P. G. Burkhalter, D. Duston, M. Emery, and J. Gardner
6 Jan. 1983 35 p refs
(DNA Proj. I25-BMXI)
(AD-A124640; NRL-MR-5003) Avail: NTIS HC A03/MF A01 CSCL 20/9

The use of locally embedded tracers within laser-irradiated solid targets has led to a new class of diagnostic methods for laser-produced plasmas. Demonstrated uses of tracers include the first visualizations of hydrodynamic flow of laser-ablated materials and improved spectroscopic measurements of plasma density and temperature profiles; comparisons with a two dimensional hydrody-

namics computer code are shown. Proposed future uses of tracers include the first measurements of fluid velocity profiles and improved determinations of mass ablation rates. Author (GRA)

N83-26450# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.
CARBON MONOXIDE IN-FLIGHT INCAPACITATION: AN OCCASIONAL TOXIC PROBLEM IN AVIATION
Delbert J. Lacefield, Patricia A. Roberts, and Paula M. Grape Oct. 1982 10 p refs
(AD-A123849; FAA-AM-82-15) Avail: NTIS HC A02/MF A01 CSCL 06/20

Results from the toxicological study of samples from 4,072 pilots killed in general aviation accidents have revealed that carbon monoxide has been the cause of incapacitation in 21 (0.5 percent) of the cases. Two cases are presented that are typical of accidents caused by incapacitation from carbon monoxide, in that no cause was determined until after toxicological examination of the victims was made. Since no suitable system is available to warn pilots of elevated carbon monoxide levels in the cabin, education of pilots should be undertaken to make them aware of the hazards of exposure to and symptoms produced by this highly toxic gas. Author (GRA)

N83-26451# JRB Associates, McLean, Va.
POTENTIAL HUMAN STUDY POPULATIONS FOR NONIONIZING (RADIO FREQUENCY) RADIATION HEALTH EFFECTS
Lawrence C. Novotney and Inara Gravitis Dec. 1982 150 p refs (Contract EPA-68-02-3470)
(PB83-147447; EPA-600.1-82-017) Avail: NTIS HC A07/MF A01 CSCL 06R

This research project was initiated to identify potential human populations for future epidermiological studies of the health effects of radio frequency radiation. Through a literature search and contacts with various groups and organizations, numerous occupations and applications of radio frequency radiation (RFR) were identified and evaluated for their suitability for further study. Many populations were eliminated early because their potential exposure to RFR was too limited or data necessary for epidermiological research were unavailable. Eight populations were evaluated in detail and appear to satisfy many of the criteria for epidemiological research and could be useful study groups in an investigation of the health effects of non-ionizing radiation. Author (GRA)

N83-26452# Michigan Univ., Ann Arbor. Transportation Research Inst.
SUPERIOR-INFERIOR HEAD IMPACT TOLERANCE LEVELS
Final Report
Nabih M. Alem, Guy S. Nusholtz, and John W. Melvin Nov. 1982 279 p refs
(Contract PHS-NIOSH-210-79-0028)
(PB83-144501; UMTRI-82-42) Avail: NTIS HC A13/MF A01 CSCL 06P

Experimental kinematic response and injury data resulting from axial (superior-inferior) head impacts were generated, and then used to establish a head/neck tolerance level used in the design and testing of protective industrial helmets. Fourteen impact tests were conducted on cadaveric specimens. Parameters of impact were the impactor weight (10 kg), its velocity at impact (7 to 11 m/s), padding of the impactor (0- to 5-cm ensolite), and the neck alignment with the spinal column. Peaks of the impact force ranged from 3 to 17 kN. Measured responses were the head 3-D motion and the spinal column accelerations. GRA

N83-26406# Mississippi Univ., Jackson. Dept. of Pharmacology and Toxicology.
ORGANIZATIONAL EFFECTS OF HORMONES AND HORMONALLY-ACTIVE XENOBIOTICS ON POSTNATAL DEVELOPMENT
Coral A. Lamartiniere, Tracy Sloop, James Clark, Hugh A. Tilson, and George W. Lucier *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 96-121 refs (For primary document see N83-26400 15-51)
(PAPER-6) Avail: NTIS HC A16/MF A01 CSCL 06/3

N83-26407# Cincinnati Univ., Ohio. Dept. of Environmental Health.
MALE VS. FEMALE MEDIATED TERATOGENESIS
Jeanne M. Manson *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 122-139 refs (For primary document see N83-26400 15-51)
(PAPER-7) Avail: NTIS HC A16/MF A01 CSCL 06/3

N83-26410# Air Force Occupational and Environmental Health Lab., Brooks AFB, Tex. Industrial Hygiene Branch.
AN INDUSTRIAL HYGIENIST'S VIEW: RELATIONSHIPS BETWEEN INDUSTRIAL HYGIENE SAMPLING, HUMAN EXPOSURE STANDARDS, AND EXPERIMENTAL TOXICOLOGY
James C. Rock *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 164-191 refs (For primary document see N83-26400 15-51)
(PAPER-11) Avail: NTIS HC A16/MF A01 CSCL 06/3

N83-26411# Air Force Occupational and Environmental Health Lab., Brooks AFB, Tex.
EVALUATING HEALTH HAZARDS ASSOCIATED WITH AIRCRAFT FUEL CELL MAINTENANCE
Edward C. Bishop *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 192-202 ref (For primary document see N83-26400 15-51)
(PAPER-12) Avail: NTIS HC A16/MF A01 CSCL 06/3

N83-26412# Delaware Univ., Newark. Toxicology Research Lab.
PHARMACOKINETIC EVALUATIONS IN RELATION TO USE OF TOXICOLOGICAL DATA
John C. Ramsey *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 234-249 refs (For primary document see N83-26400 15-51)
(PAPER-15) Avail: NTIS HC A16/MF A01 CSCL 06/3

N83-26413# Delaware Univ., Newark. Dept. of Chemical Engineering.
A PHYSIOLOGICALLY-BASED PHARMACOKINETIC MODEL FOR 2,5-HEXANEDIONE
Michael J. Angelo and Kenneth B. Bischoff *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 250-286 refs (For primary document see N83-26400 15-51)
(PAPER-16) Avail: NTIS HC A16/MF A01 CSCL 06/3

N83-26414# National Inst. of Health, Bethesda, Md. Biomedical Engineering and Instrumentation Branch.
PHYSIOLOGICAL MODELING OF ENTERIC TRANSPORT
Peter M. Bungay, Robert L. Dedrick, and H. B. Matthews *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 287-298 refs (For primary document see N83-26400 15-51)
(PAPER-17) Avail: NTIS HC A16/MF A01 CSCL 06/3

N83-26415# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Toxic Hazards Div.
PHYSIOLOGICAL PHARMACOKINETIC MODELS FOR THE INHALATION OF GASES AND VAPORS
Melvin E. Andersen *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 299-316 refs (For primary document see N83-26400 15-51)
(PAPER-18) Avail: NTIS HC A16/MF A01 CSCL 06/3

N83-26423# Joint Publications Research Service, Arlington, Va.
ELECTROSTATIC SHIELDING AGAINST COSMIC RADIATION (CURRENT STATUS AND PROSPECTS)
T. Ya. Ryabova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 2-6 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 4-7 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

N83-26424# Joint Publications Research Service, Arlington, Va.
POSSIBLE DIRECTIONS OF REFINING CRITERIA OF RADIATION SAFETY OF SPACEFLIGHTS
Ye. Ye. Kovalev, V. M. Petrov, V. A. Sakovich, and M. A. Sychkov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 7-14 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 8-14 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

N83-26426# Joint Publications Research Service, Arlington, Va.
EFFECT OF 140-DAY FLIGHT ON BLOOD AMINO ACID LEVELS IN COSMONAUTS
I. G. Popov and A. A. Latskevich *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 29-38 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 23-30 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

N83-26428# Joint Publications Research Service, Arlington, Va.
PHYSICAL STATUS AND BIOCHEMICAL PARAMETERS OF OBESE PILOTS AFTER IMPLEMENTATION OF PREVENTATIVE MEASURES
H. Lyson-Wojcechowska, M. Pendziwiatr, Z. Koter, and K. Kwarecki *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 46-49 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 35-37 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

N83-26429# Joint Publications Research Service, Arlington, Va.
EFFECT OF SEVEN-DAY SPACEFLIGHT ON STRUCTURE AND FUNCTION OF HUMAN LOCOMOTOR SYSTEM
R. Hernandez-Korwo, I. B. Kozlovskaya, Yu. V. Kreydich, S. Martinez-Fernandez, A. S. Rakhmanov, E. Fernandez-Pone, and V. A. Minenko *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 50-58 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 37-44 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

N83-26430# Joint Publications Research Service, Arlington, Va.
POSTURAL HEMODYNAMIC CHANGES FOLLOWING SHORT-TERM SPACEFLIGHTS
T. D. Vasilyeva, Kh. Kh. Yarullin, and V. I. Zhuyko *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 59-64 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 44-48 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

N83-26431# Joint Publications Research Service, Arlington, Va.
HUMAN VESTIBULAR REACTIONS TO GALVANIC STIMULATION OF LABYRINTHS
G. I. Gorgiladze, G. I. Samarin, and S. N. Rusanov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 65-71 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 48-52 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

N83-26432# Joint Publications Research Service, Arlington, Va.
HUMAN BLOOD BIOGENIC AMINES AND THEIR PRECURSORS IN ANTIORTHOSTATIC POSITION AND WITH INTAKE OF PHARMACOLOGICAL AGENTS FOR PREVENTION OF SEASICKNESS SYNDROME
N. A. Davydova, S. L. Ilina, and V. V. Sabayev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 72-77 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 53-56 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

N83-26439# Joint Publications Research Service, Arlington, Va.
EFFECT OF PHYTONCIDES ON CEREBRAL CIRCULATION IN FLIGHT CONTROLLERS DURING PROFESSIONAL WORK
Ya. S. Leshchinskaya, N. M. Makarchuk, A. F. Lebeda, V. V. Krivenko, A. K. Sgibnev, and T. S. Bagatskaya *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 115-120 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 80-83 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

N83-26446# Joint Publications Research Service, Arlington, Va.
ELECTRICAL ACTIVITY OF THE SYMPATHETIC NERVOUS SYSTEM RECORDED ON SKIN SURFACE
V. I. Skok, L. V. Melnichenko, I. N. Remizov, S. L. Purnyn, and V. V. Gerzanich *In its* USSR Rept.: Life Sci.: Biomed. and Behavioral Sci., No. 34 (JPRS-83514) 20 May 1983 p 58-60 refs Transl. into ENGLISH from Dokl. Akad. Nauk Ukrainskoy SSR. Ser. B (Kiev), no. 12, Dec. 1982 p 69-71 (For primary document see N83-26443 15-51)
Avail: NTIS HC A07

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N83-26409# Dow Chemical Co., Midland, Mich. Toxicology Research Lab.
TOXICITY, GENDER, AND NEUROBEHAVIORAL RESPONSES
Joel L. Mattsson *In* Calif. Univ. Proc. of the 12th Conf. on Environ. Toxicol. Apr. 1982 p 147-154 refs (For primary document see N83-26400 15-51)
(PAPER-9) Avail: NTIS HC A16/MF A01 CSCL 06/3

N83-26445# Joint Publications Research Service, Arlington, Va.
FORECASTING PSYCHOLOGICAL AND PHYSICAL PERFORMANCE UNDER STRESSFUL CONDITIONS
A. Aykaraliyev *In its* USSR Rept.: Life Sci.: Biomed. and Behavioral Sci., No. 34 (JPRS-83514) 20 May 1983 p 22-25 Transl. into ENGLISH from Sov. Kirg. (Frunze), 25 Jan. 1983 p 3 (For primary document see N83-26443 15-51)
Avail: NTIS HC A07

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N83-26453 Royal Signals and Radar Establishment, Malvern (England).
PREDICTIVE DISPLAY DESIGN FOR A TWO-AXIS CONTROL TASK
P. J. Goillau Aug. 1982 34 p refs Sponsored Loughborough Univ. of Technology and Warren Spring Lab.
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A simulation study was carried out using a generalized two-axis control and guidance task to investigate predictive display design parameters. Predictive displays are found to bring about a substantial improvement in man-machine system performance over

unaided manual control. Recommendations are made regarding the choice of prediction model and prediction span as a function of controlled system dynamics and input uncertainty. The need to augment human anticipatory skills in complex control tasks is highlighted, and a methodology for optimizing predictive display design which could be extended to aerospace and missile guidance applications is presented. Author (ESA)

N83-26454# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5.
INTERNATIONAL CONFERENCE ON PROTECTIVE CLOTHING SYSTEMS
Kim Amundin, ed., Carin Brunius, ed., and Aasa Braend-Persson, ed. Jan. 1983 421 p refs Proc. held at Stockholm, 23-27 Aug. 1981; sponsored by Defence Material Administration, Swedish Textile Industries, Almedahls AB, Boraas Waefveri AB, AB Eiser, Nordiska Fjaeder AB, Rosens Trikaaindustrier AB, Trelleborg AB and Gustaf Werner AB
(FOA-C-54043-H1) Avail: NTIS HC A18/MF A01

Protective functions of clothing systems, evaluation methods, and design of protective clothing systems were discussed. For individual titles, see N83-26455 through N83-26491.

N83-26455# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
THE SPACE SUIT: MAN'S MOST SOPHISTICATED PROTECTIVE GARMENT
Carl-Johan Clemedson *In its* Intern. Conf. on Protective Clothing Systems Jan. 1983 p 17-27 refs (For primary document see N83-26454 15-54)
Avail: NTIS HC A18/MF A01

The design and development of the space suit used in the Apollo lunar missions are described. Mobility problems are overcome by using constant volume bellows joints. The suit is effective in the temperature range from -273 to > 200 C. The portable life support system allows 4hr autonomous operation on the lunar surface. The outer layer of the suit can stop 0.5 g/cc particles traveling at 30 km/sec. Author (ESA)

N83-26456# National Board of Occupational Safety and Health, Solna (Sweden). Research Unit of Climatic Physiology.
ROLE OF CLOTHING FOR MAN'S HEAT EXCHANGE WITH THE ENVIRONMENT
Ingvar Holmer *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 31-50 refs (For primary document see N83-26454 15-54)
Avail: NTIS HC A18/MF A01

Methods of evaluating protection offered by clothing against thermal stress; of comparing the performance of garments; and of measuring the physiological strain associated with work for a given clothing assembly are discussed. Predictive models of thermal strain are presented. Thermal insulation and resistance to evaporative heat transfer are considered. The influence of body motion, wind and wetness on thermal properties is examined.
Author (ESA)

N83-26457# Technical Research Centre of Finland, Tampere. Textile Lab.
RESEARCH CONCERNING COLD WEATHER CLOTHING
Harriet Meinander and Rauno Paaaakkoenen (Oulu Regional Inst. of Occupational Health, Finland) *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 51-57 refs (For primary document see N83-26454 15-54)
Avail: NTIS HC A18/MF A01

Results of physical measurements of textile materials and combinations, physiological tests in a climatic chamber of clothing systems, and field tests in Lapland during winter are discussed. Tests on an overall for extremely cold environments are summarized. Subjective assessments rate the overall higher than control garments, but measurement results show no significant differences between the tests. Author (ESA)

N83-26458# Prins Maurits Lab. TNO, Rijswijk (Netherlands).
SKIN PROTECTION AGAINST NUCLEAR HEAT FLASH
J. Medema *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 59-66 ref (For primary document see N83-26454 15-54)
Avail: NTIS HC A18/MF A01

Six protective garment outerlayers backed by carbon loaded PU foam and normal combat clothing were subjected to 120 and 60 J pulses from a 2.5 kw xenon bulb in order to simulate the effects of thermal radiation from a 30 kton nuclear explosion. Results show that: flame retardancy of an outerlayer of NBC clothing is a prerequisite for good nuclear heat flash protection; flame retardancy of the foam layer is necessary also when protection above 60 J/cmsq in 1 sec is wanted; nonmelting, nonshrinking outer fabric behaves best in nuclear heat flash protection; and a built-in reflective layer, either mineral fiber or a white fabric has a positive effect on protection. Author (ESA)

N83-26459# Prins Maurits Lab. TNO, Rijswijk (Netherlands).
SKIN PROTECTION AGAINST CHEMICAL WARFARE AGENTS
M. vanZelm, J. Medema, and P. Th. vanRaaij *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 67-72 (For primary document see N83-26454 15-54)
Avail: NTIS HC A18/MF A01

Penetration tests for impermeable materials, vapor penetration of permeable materials, and penetration from static or falling drops of the inner and outer layers of garments for protection against chemical weapons are discussed. Experience shows that impermeable materials can be easily tested by the drop method. In the catagory of rubbers, butyl rubber is the best choice; several plastics can be chosen. Vapor tests give a good impression about the quality of the absorbent layer in permeable protective clothing. Fully reticulated PU foam loaded with carbon shows the highest activity. A tightly woven liquid repellent outerlayer or a two layer fabric repellent outside wicking give the best protection.
Author (ESA)

N83-26460# Helly-Hansen A.S., Moss (Norway).
SEMIPERMEABLE PROTECTIVE SUIT NM77
Tors Sandly Nislen *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 P 73-81 (For primary document see N83-26454 15-54)
Avail: NTIS HC A18/MF A01

A suit which protects the whole body except hands, feet and face is presented. Around 200 l/min of air is exchanged at 40% of maximum activity, allowing 16% of produced sweat to evaporate. While soldiers reach exhaustion within 91 min using an impermeable garment (Nato B-2) at the working load of 38% of the maximum, they can work at 43% of the maximum for 100 min in an NM77 suit without coming near to exhaustion. The suit has a 24 hr penetration time for mustard gas as opposed to 8 hr for B-2 suits. Although the NM77 suit gives poor protection against aerosols, the use of a respirator with the suit ensures adequate protection.
Author (ESA)

N83-26461# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
PERMEATION OF ORGANIC SUBSTANCES THROUGH POLYMER MATERIALS USED IN PROTECTIVE CLOTHING
Allan Linnarson *In its* Intern. Conf. on Protective Clothing Systems Jan. 1983 p 83-88 refs (For primary document see N83-26454 15-54)
Avail: NTIS HC A18/MF A01

The permeability of polymer membranes by pure solvents and by mixtures of solvents was tested. Mass spectrometer readings indicate that rapidly penetrating substances act as pilots for slowly penetrating ones. The behavior of mixtures can be classified in four groups: the lag time for the pilot is unchanged and the lag time for the piloted substance is shortened; the pilot substance has a prolonged lag time and the piloted one has a decreased time; shortened lag times for both pilot and piloted substances; and all systems with unchanged lag times. For membranes punched from nitrile rubber and tested with toluene, the measured penetra-

tion curve does not have the normal S-shape. After the initial penetration the concentration of toluene on the back side of the membrane increases rapidly to a maximum and then declines to a steady state. Author (ESA)

N83-26462# Research Inst. of National Defence, Stockholm (Sweden). Explosives Div.

AN ANTHROPOMETRIC DUMMY FOR BLAST RESEARCH

Arne Joensson, Carl-Johan Clemedson, and Erik Arvebo *In its* Intern. Conf. on Protective Clothing Systems Jan. 1983 p 89-97 refs (For primary document see N83-26454 15-54)

Avail: NTIS HC A18/MF A01

A dummy torso which enables lung damage resulting from blasts to be predicted is described. The pressure-time functions of the blast are recorded by a pressure transducer inside a model lung. This lung can be connected to a head bored with holes to simulate the human respiratory system air ways, or to a head with pressure transducers which measure loads on tympanic membranes. Geometrical and structural similarity of the dummy to a real body, dynamic properties of the torso, indications of the severity of blast exposure, and sensitivity to factors influencing the production of lung injury, and strength of material and repeatability are discussed. Author (ESA)

N83-26463# Army Natick Research and Development Command, Mass. Individual Protection Lab.

THE DEVELOPMENT OF A NEW HELMET FOR THE US ARMY

John V. E. Hansen *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 99-108 refs (For primary document see N83-26454 15-54)

Avail: NTIS HC A18/MF A01

A helmet with troop acceptance/preference > 90% was designed after casualty studies revealed significant numbers of head wounds with the old helmet, which was also considered to be uncomfortable to wear for long periods. Helmet design was influenced by hearing and vision requirements and the necessity for the helmet to be compatible with a variety of weapons and equipment, as well as the fragmentation vest to be worn with the helmet. The ballistic effectiveness of various materials in terms of casualty reduction not only from fragment penetration, but in terms of dynamic deflection/blunt trauma injuries was investigated. Additional constraints of neck musculature stress during ballistic impact and permissible heat stress also were taken into account. Author (ESA)

N83-26464# Institute for Perception RVO-TNO, Soesterberg (Netherlands).

FUNCTIONAL TESTING OF BODY ARMOR

Wouter A. Lotens *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 109-117 refs (For primary document see N83-26454 15-54)

Avail: NTIS HC A18/MF A01

A spall protective vest was chosen from four models and a fragmentation protective vest from five models in a sequence of tests covering ballistic protection, functional obstruction, mobility and user experiences. Test design was optimized with respect to effort by successive reduction of the number of models. Functional obstruction was scored by an ergonomics expert at a large number of military functions. Mobility was tested with 5 different performance tests, following a test design with 12 subjects. Overall loss of performance is 5% for spall protection, 11% for fragmentation protection and 15% for an additional type such as bullet protection. Author (ESA)

N83-26465# National Board of Occupational Safety and Health, Solna (Sweden). Research Unit of Climatic Physiology.

PHYSIOLOGICAL EVALUATION OF EVAPORATIVE HEAT TRANSFER RESISTANCE BY CLOTHING

Ingvar Holmer and Sture Elnaes *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 121-132 refs (For primary document see N83-26454 15-54)

Avail: NTIS HC A18/MF A01

A technique for the determination of water vapor pressure at the skin surface and its application to the measurements of dry and evaporative heat transfer through clothing are described. The method is based on partitional calorimetry of the heat exchange of man with the environment. All experiments are performed in a climatic chamber in which air temperature and relative humidity can be controlled to + or - 0.5C and + or - 2.5%. Mean skin temperature is calculated from the area weighted average from at least eight different sites. Metabolic energy production is calculated from measurements of oxygen uptake. Evaporative heat loss is determined by continuous weighing. Evaporation rate is corrected for metabolic weight loss and the evaporative heat loss is determined. Water vapor pressure is determined in an air sample withdrawn from a system of six plastic tubes each terminating at representative areas of the skin surface. Results for various types of clothing are presented. Author (ESA)

N83-26466# Kansas State Univ., Manhattan. Inst. for Environmental Research.

A SCALING PROCEDURE FOR EVALUATING THE COMFORT CHARACTERISTICS OF PROTECTIVE CLOTHING

Frederick H. Rohles, Jr., Stephan A. Konz, Elizabeth A. McCullough, and George A. Milliken *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 133-140 refs (For primary document see N83-26454 15-54)

Avail: NTIS HC A18/MF A01

A method for evaluating subjective responses to the environment and to given features of an environment is presented. The method combines factor analytic techniques with bipolar adjective semantic differential scales. The scale was used to determine the comfort characteristics of protective clothing at high temperatures. Tests were carried out in an environmental chamber. Physiological measurements were treated by an analysis of variance with temperature, garment and observation as sources of variance. The F ratios are not significant, nor are those for thermal sensation or thermal comfort. For the clothing comfort scale however, results are significant at $p < 0.01$ when 'garment' is the source of variance. Author (ESA)

N83-26467# Forschungsinstitut Hohenstein, Boennigheim (West Germany). Bekleidungsphysiologisches Inst.

EVALUATION OF COMFORT CHARACTERISTICS OF CLOTHING BY USE OF LABORATORY MEASUREMENTS AND PREDICTIVE CALCULATIONS

K. H. Umbach *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 141-149 refs Sponsored by Forschungskuratorium Gesamttextil and Arbeitsgemeinschaft Industrieller Forschungsvereinigungen (AIF) (For primary document see N83-26454 15-54)

Avail: NTIS HC A18/MF A01

A five level system for the physiological evaluation of clothing is outlined. Physical analysis of fabrics on a skin model is followed by biophysical analysis of clothing systems using movable manikins. Physiological data and subjective ratings are obtained in controled wear tests with subjects in climatic chambers. Controled, limited, field tests precede full field tests. Results indicate that the laboratory tests predict accurately the wear comfort reported in field tests. Author (ESA)

N83-26468# Centre de Recherches du Service de Sante des Armees, Lyons (France). Div. of Physiologie.

PHYSIOLOGICAL EVALUATION OF THERMAL STRAIN DUE TO PROTECTIVE CLOTHING: APPLICATION TO HELICOPTER PILOTS

Rene Henane, Jacques Bittel, and Marc Guillermin *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 151-159 refs (For primary document see N83-26454 15-54)

Avail: NTIS HC A18/MF A01

Dry and humid heat exchanges occurring in helicopter pilots wearing protective suits were tested in a climatic chamber and in flight conditions on sunny and warm days. An index of water permeability (Iw) was derived: Iw = Ec1/Enu where Ec1 and Enu are steady state evaporative rate in clothed and nude

conditions; Iw=1 for totally permeable clothing and Iw=0 for totally impermeable clothing. The absolute evaporation through clothing layers measured by weighing was compared to predicted evaporation. This index, combined with biophysical estimation of CLO and the permeability index Im, is proposed as a means of estimating physiological stress due to the thermal burden of clothing.
Author (ESA)

N83-26469# Wuppertal Univ. (West Germany). Fachgebiet Arbeitssicherheit/Ergonomie.
STRESS AND STRAIN BY WEARING PROTECTIVE CLOTHING
Th. Hettinger and Gunther Eissing *In* Research. Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 161-166 refs Sponsored by Bundesanstalt fuer Arbeitsschutz und Unfallforschung (For primary document see N83-26454 15-54)
Avail: NTIS HC A18/MF A01

Tests carried out in order to: validate methods for predicting stress and strain associated with wearing protective clothing; to study the protection offered against heat radiation; and to assess the influence of acclimatization on resistance to thermal stress are summarized. Analysis indicates that increase of stress and strain associated with different kinds of clothing can be proved statistically at different levels of significance for various levels of stress on a treadmill. The metabolic rate by work is significant only for the difference between complete protection and the other kinds of clothing, whereas the work pulse rate is significantly different between all kinds of clothing. Author (ESA)

N83-26470# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
HEAT STRESS, HEAT STRAIN AND RISK OF HEAT DISORDER
Wouter A. Lotens *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 167-175 refs (For primary document see N83-26454 15-54)
Avail: NTIS HC A18/MF A01

A diagram that summarizes approaches to thermoregulatory modeling is presented. Input for the diagram are environmental conditions, related via clothing, the human body and task execution to task performance. By postulating that performance fully breaks down by heat disorder when heat strain exceeds a critical value, risk of heat disorder can be calculated. Individual risk is hard to predict, but the risk for a large group can be predicted with models, if risk is high. For low risk, residual cooling power (maximum possible cooling minus heat production) is introduced. When this becomes lower than 250 W, risk increases for untrained people (below 100 W for trained people). Author (ESA)

N83-26471# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 5
STRESS AND PERFORMANCE OF MILITARY PILOTS UNDER HEAT LOAD
Erland Svensson *In its* Intern. Conf. on Protective Clothing Systems Jan. 1983 p 177-193 refs (For primary document see N83-26454 15-54)
Avail: NTIS HC A18/MF A01

The effects of thermal stress on perception, decision making, motor behavior, thermal comfort, physical and mental workload, activation and tension level, and motivation were studied. During trials lasting 190 min, subjects accomplished three different psychological tests and answered a questionnaire repeated 5 times at 30 min intervals. Subjects also performed a compensatory tracking task. Subjects wore winter flying gear under conditions of mild, moderate or extreme thermal stress. Results indicate that given sufficient motivation subjects can cope with complex mental tasks in protracted stressful situations. Tracking-task performance is more affected by thermal stress than are memory or reaction times. Author (ESA)

N83-26472# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
RESTRAINT BY CLOTHING UPON FIRE-FIGHTERS PERFORMANCE
Erik J. G. vandeLinde *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 195-204 refs Sponsored by Technical and Inspection Dept. of Fire Services (For primary document see N83-26454 15-54)
Avail: NTIS HC A18/MF A01

Physiological strain caused by metabolic and environmental heat and fire protective clothing was studied. Six subjects performed light work on a treadmill in two different climates, wearing three different types of clothing. For each of the resulting 36 sessions heat balance was reconstructed and clothing parameters were calculated. Measurements show little difference in insulation but large differences are found in water vapor permeability, ranging from 0.11 to 0.25. Poor permeability results in high heat strain, especially during moderately hot work or recovery periods. Predictions of tolerance time during a moderately hot fire trial are shorter than measured. Differences in tolerance time between clothing are predicted correctly. A diagram that displays safe work time as a function of metabolic and environmental heat load is proposed. Author (ESA)

N83-26473# Kansas State Univ., Manhattan. Inst. for Environmental Research.
MEASURING THE THERMAL INSULATION AND PERMEABILITY OF PROTECTIVE CLOTHING USING A COPPER MANIKIN
Elizabeth A. McCullough, Frederick H. Rohles, Jr., and Stephan A. Konz *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 205-214 refs (For primary document see N83-26454 15-54)
(Grant S-R01-OH-00874)
Avail: NTIS HC A18/MF A01

Test methods for measuring and quantifying the resistance to heat transfer of military clothing assemblies were used to study the thermal insulation and evaporative impedance of clothing worn in hot industrial environments. Results indicate that the clothing items which provide the most protection to the wearer from industrial hazards often restrict the amount of body heat loss that is possible through radiation, convection, conduction, and particularly evaporation. Although the copper manikin measurements are useful in ranking work clothing assemblies, they should be supplemented by physiological chamber studies. Author (ESA)

N83-26474# Kansas State Univ., Manhattan. Inst. for Environmental Research.
THE EFFECTIVENESS OF WATER COOLING UNDER PROTECTIVE CLOTHING AT TEMPERATURES BETWEEN 22 C AND 55 C
Stephan A. Konz, Frederick H. Rohles, Jr., and Elizabeth A. McCullough *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 215-221 refs (For primary document see N83-26454 15-54)
(Grants TV54678A; DE-AC01-79CS-20272)
Avail: NTIS HC A18/MF A01

Non-heat-acclimatized subjects were exposed to heat stress in temperatures ranging from 22 to 55 C in 2 hr sessions (maximum). Subjects sometimes wore respirators and water cooling garments so their effect on heat tolerance could be judged. Subjects worked at a moderate metabolic rate (290 Watts) until they completed 120 min. of work or until they were removed for medical reasons. The best criterion of heat stress tolerance time without auxillary cooling, and acceptance of the cooling units by the users were studied. The respirator has no effect on tolerance time or clothing comfort. Of the 125 trials where the subject was removed early, only 9 (7%) were due to rise in body temperature. Excessive heart rate (over 160 beats/min) caused removal of 79 (63%) and rise in diastolic blood pressure (over 110 mm Hg) removal of 26 (21%); all others were 9%. Predicted tolerance time without cooling ranges from 300 min at environmental temperatures of 22 C to 15 min at environmental temperature of 43 C. The water cooled garment increases tolerance time by 15 min. At 55 C, tolerance time increases 50%. Author (ESA)

N83-26475# Swedish Inst. for Textile Research, Gothenburg (Sweden).

A FOOT-AND-LEG SIMULATOR FOR ASSESSING COMFORT PROPERTIES OF CLOTHING

Sven-Erik Haenel *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 223-228 (For primary document see N83-26454 15-54)

Avail: NTIS HC A18/MF A01

A foot and leg simulator for assessing thermal and moisture resistance of clothing is described. Electrical heater wires and thermistors are imbedded in the surface. The foot is partitioned into five separately heated sweat gland areas, each with a water inlet. The ankle and knee areas are used as guard zones. The lower leg is divided into three sweat gland areas. Additional thermistors can be placed outside the skin. The foot and the leg are painted twice with heat conducting paint. A form-fitting stocking made from 2 mm thick nonwoven skin is sewn into place. Outside this is another stocking sewn from Goretex. This outer layer is waterproof but has a very low moisture resistance, ensuring that the test specimen is not wetted by the sweat glands. A microcomputer is used for data collection and control of temperatures and water dosing. Author (ESA)

N83-26476# Linkoeping Univ. (Sweden). Dept. of Biomedical Engineering.

A SYSTEM FOR RECORDING WATER VAPOR PERMEABILITY THROUGH CLOTHING MATERIALS

Lena Nilsson and Gert E. Nilsson *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 229-234 refs Sponsored by Swedish Research Inst. of National Defence (For primary document see N83-26454 15-54)

Avail: NTIS HC A18/MF A01

An evaporimeter system for measuring clothing material resistance to water vapor is described. An incubator with variable temperature and relative humidity simulates ambient conditions. A cylindrical temperature-regulated water bath is placed inside the chamber. Evaporation from the bath is adjusted by altering the water temperature with a temperature regulator. The bath is placed on a magnetic stirrer assembly. Above the bath there is a modular system of rings for fixing the clothing specimens. Specimens can be placed at different distances from the evaporative water surface. The water vapor permeability of a single layer as well as that of several layers, in contact or separated by an air gap, can be measured. The evaporimeter probe is placed in the climate chamber. Evaporimeter and the temperature regulator signals are recorded on a multichannel ink recorder. Author (ESA)

N83-26477# Swedish Inst. for Textile Research, Gothenburg (Sweden).

LABORATORY EVALUATION OF COMFORT RELEVANT MOISTURE AND HEAT TRANSFER BEHAVIOR OF TEXTILE FABRICS

Roshan Shirshoo *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 235-241 refs (For primary document see N83-26454 15-54)

Avail: NTIS HC A18/MF A01

A method for measuring moisture and heat transfer properties of fabrics at any set of atmospheric conditions in the temperature range from 20 to 40 C at relative humidity up to 95% is presented. Test specimens are preconditioned in a box containing a standard absorbent. This box is placed in the climatic chamber with the test specimen as interface between box and chamber. Moisture transfer is calculated from the weight increase of the absorber. For heat transfer measurements a modified BS 4745: 1971 procedure is used. Preconditioned specimens are placed in LD/HD/LD polyethylene film bags. A 100 Pa pressure is applied and the bags are sealed. Author (ESA)

N83-26478# National Board of Occupational Safety and Health, Solna (Sweden). Section for Climatic Physiology.

THERMAL INSULATION OF HANDWEAR MEASURED WITH AN ELECTRICALLY HEATED HANDMODEL

Sture Elnaes and Ingvar Holmer *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 243-250 ref (For primary document see N83-26454 15-54)

Avail: NTIS HC A18/MF A01

A hand model consisting of a thin plastic outer surface filled with foam and divided into 16 zones is presented. Each zone is covered with kanthal wires in a close pattern. The wires are joined together and to the surface with epoxy glue and painted to simulate black body properties of skin. Thermistors measure the temperature of each zone. Results for measurements on winter mittens are shown. Author (ESA)

N83-26479# Norwegian Defence Research Establishment, Kjeller.

HEATED CLOTHING SYSTEMS FOR FIELD USE

Staale Rustad *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 251-259 refs (For primary document see N83-26454 15-54)

Avail: NTIS HC A18/MF A01

Portable heaters for local warming of extremities and for the whole body are discussed. A charcoal burning system is introduced. The charcoal system was used for protection from cold of casualties before and during transportation to field hospitals. Thermal equilibrium can be maintained for lightly clothed individuals under Arctic conditions. The system can be used inside garments when restriction of movement makes sufficient clothing insulation impractical. Author (ESA)

N83-26480# Norwegian Defence Research Establishment, Kjeller.

LIGHT WEIGHT CHARCOAL BURNING HEATER AND HEAT DISTRIBUTION SYSTEM FOR FIELD USE

B. Nordli, T. A. Oftedal, and P. O. Solberg *In* Research of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 261-266 refs (For primary document see N83-26454 15-54)

Avail: NTIS HC A18/MF A01

A charcoal-fuelled casualty heater weighing 600 grams was developed. The charcoal stick is contained in a disposable canister. A miniature battery-powered fan provides combustion air and distributes warm air. The air temperature is controlled by a bimetallic strip. The heat output may be varied in the 50 to 300 W range. A typical heat output is in the order of 150 W for 5 hr on one charcoal element. The warm air is distributed by flexible flat textile tubes or sheets. These can, due to the inside fabric, be squeezed or bent without restricting the warm air flow. Author (ESA)

N83-26481# Centre Scientifique et Technique de l'Industrie Textile Belge, Gent.

EVALUATION OF THERMAL PROTECTION OFFERED BY PROTECTIVE CLOTHING SYSTEMS

Lieven Smissaert *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 267-280 refs (For primary document see N83-26454 15-54)

Avail: NTIS HC A18/MF A01

Methods for evaluating thermal protection offered by clothing systems in terms of pain threshold and blistering are reviewed. Results are improved if the delay between flame application and transmittance of the energy is taken into account. Skin simulants are useful for visualizing 2nd degree burn injuries, but the backing material to which the skin is fixed can influence results. Author (ESA)

N83-26482# Defence Technology and Procurement Group, Bern (Switzerland). Div. 11: Equipment.

PROTECTIVE CLOTHING AGAINST HEAT AND FIRE FOR TANK CREWS

Rudolf Loss *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 281-289 refs (For primary document see N83-26454 15-54)

Avail: NTIS HC A18/MF A01

A profile of requirements for protective clothing for tank crews is presented. The profile considers protection, comfort, service life, handling, color, and cleaning. Methods for measuring the heat protection factor and flame resistance of materials are reviewed. Compromises between protective function and comfort are proposed. Author (ESA)

N83-26483# Danish Defence Command, Copenhagen.
PROTECTION OF THE HANDS
Leif Vanggaard (Naval Medical Service, Vedbaek, Denmark) *In* Research Inst. of National. Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 291-296 (For primary document see N83-26454 15-54)
Avail: NTIS HC A18/MF A01

Temperature regulation in the hand is described. In the hands (and feet) arteriovenous anastomoses bypass the normal capillary system and shunt blood directly from the arteries to the superficial veins. The arteriovenous anastomoses close when deep body temperature falls below normal. Preservation of deep body temperature overides the functional demands of hands and feet. Glove design problems posed by the need to maintain hand temperature while reducing sweating are discussed. Author (ESA)

N83-26484# Bundesamt fuer Wehrtechnik und Beschaffung, Koblenz (West Germany).
A NEW FABRIC FOR PROTECTIVE CLOTHING
Werner K. D. Gehrmann *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 297-306 (For primary document see N83-26454 15-54)
Avail: NTIS HC A18/MF A01

Aramid-viscose blends were tested in order to develop a flame retardant material. Technological data of blends consisting of varying percentages of the two components but with the same weave do not differ significantly. A 65% viscose - 35% aramid blend has similar mechanical properties to cotton fabrics but is cheaper, very comfortable and reduces static charge. There are no problems with finish application or dye. Author (ESA)

N83-26485# Swedish Inst. for Textile Research, Gothenburg (Sweden).
EXPECTED DEVELOPMENT OF TEXTILE CLOTHING MATERIALS AND OF IMPROVED PROPERTIES IN BATTLE DRESSES
Arnold Bernskioeld *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 309-319 (For primary document see N83-26454 15-54)
Avail: NTIS HC A18/MF A01

The wear, protective, comfort and maintenance properties of a warp satin fabric of cotton-polyester (50/50 mix) are summarized and the need to improve the quality of battle dress fabrics is considered. Fiber properties, functional efficiency, dyeing and fabric structural properties are discussed. Improvements in rain resistance, flame retardance, camouflage properties, and water vapor permeability are needed. Author (ESA)

N83-26486# Swedish Inst. for Textile Research, Gothenburg (Sweden).
DECREASING THE NUMBER OF MILITARY GARMENT SIZES WITHOUT COMFORT DETERIORATION
Margareta Cednaes *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 321-326 (For primary document see N83-26454 15-54)
Avail: NTIS HC A18/MF A01

A 12-size system for work clothes is proposed. Control dimensions are stature and mass. Size labels are marked with two intervals, for example 174 to 182 cm and 70 to 80 kg. For extensible knitwear, underwear, etc, only a few sizes are needed, e.g., below 70 kg, 70 to 80 kg, above 80 kg. Author (ESA)

N83-26487# Defence Materiel Administration, Stockholm (Sweden). Army Material Dept.
DEVELOPMENT OF PROTECTIVE CLOTHING BASED ON THE DEMANDS OF THE USER AND HIS ENVIRONMENT
Elsa Rosenblad-Wallin *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 327-333 (For primary document see N83-26454 15-54)
Avail: NTIS HC A18/MF A01

Work clothes which give adequate protection against oil and dirt and which meet mechanical engineering industry movement, comfort, and maintenance criteria were developed. Environmental mapping determined clothing demands. Environmental and activity descriptions were transformed into demands on the functional properties of the clothes. The value-assigned functional properties were transformed into textile properties. Textile property demands governed material choice. Garment design was based on anatomical studies of movements involved in typical tasks such as lathe operation. Author (ESA)

N83-26488# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5.
THE NEED FOR COMPROMISE AND FREEZING OF SYSTEMS BEFORE PRESENTING ALTERNATIVES TO DECISION MAKERS
Goesta Logaard *In its* Intern. Conf. on Protective Clothing Systems Jan. 1983 p 335-338 (For primary document see N83-26454 15-54)
Avail: NTIS HC A18/MF A01

Problems caused for designers of military clothing and equipment by the conflicting demands of users, decision makers and nonspecialistic who can influence decisions are reviewed. It is suggested that the designer should propose designs which are prohibitively expensive to change if he wants his ideas to be accepted. Author (ESA)

N83-26489# Defence Materiel Administration, Stockholm (Sweden). Army Material Dept.
POSSIBILITIES TO FULFILL MILITARY REQUIREMENTS IN AN ORDINARY PROTECTIVE CLOTHING SYSTEM
Nils-Erik Melinder *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 339-347 (For primary document see N83-26454 15-54)
Avail: NTIS HC A18/MF A01

Factors which influence the design of combat clothing are discussed. The need to include activities dictated by the influence of the enemy in design criteria is stressed. An order of priority for satisfying design requirements: technical, economic, tactical, environmental, and human factors is proposed. Author (ESA)

N83-26490# Department of National Defence, Ottawa (Ontario). Clothing, General Engineering and Maintenance Dept.
COMBAT CLOTHING IN THE 1985-2000 TIME FRAME
G. T. Holmes *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 349-370 refs (For primary document see N83-26454 15-54)
Avail: NTIS HC A18/MF A01

A combat clothing design philisophy which combines protection against specific hazards by adding special items to the basic ensemble, and incorporating as much protection as possible in the basic ensemble is predicted for the period 1985 to 2000. Synthetic fibers with inherent coloring, which react to temperature changes, are phototropic, which are sheathed, and whose basic properties are modified by irradiation are advocated. Lamination of multicomponent fibers provides multiuse materials. Protection requirements for temperature, cold, and hot environments are listed. Author (ESA)

N83-26491# Finnish Defence Forces, Helsinki. Quatermaster Section.
A SIMPLE MULTICRITERION METHOD FOR MILITARY CLOTHING EVALUATION
Jussi Haanterae *In* Research Inst. of National Defence Intern. Conf. on Protective Clothing Systems Jan. 1983 p 371-381 (For primary document see N83-26454 15-54)
Avail: NTIS HC A18/MF A01

A comparison point system based on the applied mathematics alphabet is proposed for evaluating separate clothing items and ensembles. Criterion groups are divided into first degree headlines, these into second degree headlines, and these to final questions. Research and trial results are translated into estimate ratings ranging from 1 to 10 according to the military scale of efficiency. The evaluating points are derived by multiplying: general staff cofficient x-subdivision coefficient x-estimate rating = evaluating points. Conclusions are drawn by comparing separate evaluation points, the sums of healdlines and criterion groups and

those of total points. Evaluations of three basic battle dresses are presented. Author (ESA)

N83-26492# Massachusetts Inst. of Tech., Cambridge. Man-Machine Systems Lab.
FAILURE DETECTION AND LOCATION METHOD (FDLM) Ph.D. Thesis, Jan. 1981 - 30 Sep. 1982
Uri Tsach 30 Sep. 1982 173 p refs
(Contract N00014-77-C-0256)
(AD-A123783) Avail: NTIS HC A08/MF A01 CSCL 05/8

The computerized method developed in this thesis aids the operators of complex dynamic systems to detect failures and to locate the causes in real-time. This method is called Failure Detection and Location Method (FDLM). Failures are detected when the differences between the measured system's power variables and their corresponding calculated model values are outside preset limits. The causes are located by disaggregating the model and utilizing the causal description of the resultant submodels. This method eliminates the necessity to preprogram the system's possible failure modes, but requires an efficient failure location procedure. System, sensor, and control input failures can be identified by FDLM. The display interfacing FDLM to the human operator was designed to minimize the rate of missings and false alarms as well as the operator's reaction time. A simulation test of FDLM applied to a part of a ship's engine demonstrates the advantages of the method. Author (GRA)

N83-26493# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.
PERFORMANCE OF 40- TO 50-YEAR-OLD SUBJECTS ON A RADAR MONITORING TASK: THE EFFECTS OF WEARING BIFOCAL GLASSES AND INTERPOLATED REST PERIODS ON TARGET DETECTION TIME
Richard I. Thackray and R. Mark Touchstone Apr. 1982 14 p refs
(AD-A123843; FAA-AM-82-16) Avail: NTIS HC A02/MF A01 CSCL 05/5

The present study examines the effects of wearing bifocal glasses and interpolated rest periods on the performance of 40 to 50 year old subjects on a radar monitoring task. The visual display was designed to resemble an air traffic control radar display containing computer-generated alphanumeric symbols. Forty men and women were divided into four equal-sized groups, with each group consisting of one of the four possible combinations of bifocal/no-bifocal and rest/no-rest conditions. All subjects were tested over a 2-hour session. Rest periods (a 5-minute break every 30 minutes) significantly reduced the performance decrement of 40 to 50 year old subjects, bringing performance to a level approximating that of 18 to 29 year old subjects without rest periods. The wearing of bifocal glasses did not contribute to visual strain or somatic discomfort. GRA

N83-26494*# National Academy of Sciences - National Research Council, Washington, D. C. Committee on Aircrew-Vehicle System Interaction.
AIRCREW-VEHICLE SYSTEM INTERACTION. AN EVALUATION OF NASA'S PROGRAM IN HUMAN FACTORS RESEARCH Final Report
Oct. 1982 39 p ref
(Contract NASw-3455)
(NASA-CR-172662; NAS 1.26:172662; PB83-140590) Avail: NTIS HC A03/MF A01 CSCL 01C

The review comprises an assessment of NASA's program in the study of human factors in aircraft flight management and evaluates an augmentation to the program proposed by NASA. NASA's goal is to improve the existing knowledge base of factors that tend to introduce human error. The committee concludes that NASA's effort should be concentrated on developing methods and techniques for analyzing man machine interactions, including human workload and prediction of performance and assessment of their effects on safety and reliability. GRA

N83-26425# Joint Publications Research Service, Arlington, Va.
DIET FOR HIGH-ALTITUDE MOUNTAIN CLIMBING
M. S. Belakovskiy, Ye. B. Gippenreyter, and A. S. Ushakov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 15-28 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 14-22 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

N83-26427# Joint Publications Research Service, Arlington, Va.
NUTRITIONAL VALUE OF FOOD IN TUBES FOR PILOTS AND COSMONAUTS
L. I. Kuznetsova, S. Yu. Gelfand, I. G. Popov, L. A. Gurova, and G. G. Akinshina *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 39-45 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 30-35 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

N83-26438# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF TRACE CONTAMINANTS IN ATMOSPHERE FORMED BY HABITAT ENVIRONMENT OF THE CLOSED MAN-HIGHER PLANTS-LOWER PLANTS-MICROORGANISMS SYSTEM
T. V. Nolde, Yu. V. Pepelyayev, O. A. Sukhorukov, and Ye. Ya. Shepelev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 109-114 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 76-79 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

N83-26440# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL APPROACH TO VALIDATION OF A COMBINED SANITATION METHOD FOR COSMONAUTS
S. N. Zaloguyev, A. N. Viktorov, V. Ya. Prokhorov, K. R. Tolovskaya, I. A. Parchinskaya, V. P. Gorshkov, K. V. Zarubina, M. M. Shinkareva, and T. Yu. Norkina *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 121-125 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 83-86 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering.*

N83-26495 Applied Computer Research, Phoenix, Ariz.
COMPUTER LITERATURE INDEX ANNUAL CUMULATION 1982 COVERING THE PERIOD JANUARY - DECEMBER 1982
Janet Butler, ed. 1983 314 p
(ISSN-0270-4846) Copyright. Avail: Issuing Activity

The administration of EDP, applications, communications, education and research, hardware and systems, industry and services, personnel/training, selection and financing, software and programming, systems analysis, and computer techniques are discussed. Author

N83-26496 Royal Signals and Radar Establishment, Malvern (England).
THE DISCUS HARDWARE SYSTEM
H. S. Field-Richards Jul. 1982 94 p refs
(RSRE-82010; BR86160) Copyright. Avail: Issuing Activity

The hardware philosophy behind the distributed control microprocessor system (DISCUS) is described. The DISCUS is an array of up to 15 asynchronous microprocessors that are star connected around a global store. The system is compared to other architectures. The general philosophy behind the design of DISCUS is to keep the hardware and software as simple as possible while achieving the aims of system recovery and diagnostics. Disadvantages of DISCUS include total system failure if one component fails, and the slowness of the operating system. Author (ESA)

N83-26497 Royal Signals and Radar Establishment, Malvern (England).
TWO ADVANCED COMPUTER ARCHITECTURES: A STUDY OF THEIR SUPPORT FOR LANGUAGES AND OPERATING SYSTEMS
S. R. Wiseman Jul. 1982 70 p refs
(RSRE-82013; BR86376) Copyright. Avail: Issuing Activity

The Intel iAPX-432 micro-mainframe system and the RSRE Flex multicomputer system are compared. Their effectiveness at supporting operating systems and as high level language machines are analyzed. A table summarizing the main points is included. The problems, such as storage management, parallel processing and the large semantic gap between high level languages and the computer's instruction set, are approached in different ways and with varying degrees of success, by the two systems. Central to the design of both architectures, is the organization of the main memory. Capability based addressing is used by both systems, though it is implemented using different techniques. An overview of capabilities, and a brief description of two earlier computers which used them, namely the Cambridge CAP computer and the Plessey System-250, are included. Flex is clearly in advance of the iAPX-432 with respect to high level languages. The mechanisms found for procedure calling and parameter passing, the representation and manipulation of abstract data types and program control structures, go well beyond those in the iAPX-432. The implementation of a compiler for a high level language will be easier for Flex, because of these mechanisms and of the simplicity of the stack orientated instruction set. Author (ESA)

N83-26498 British Aerospace Dynamics Group, Stevenage (England). Reliability and Maintainability Dept.
RELIABILITY ASPECTS OF MICROPROCESSOR SYSTEMS
C. J. Dale, L. N. Harris, P. D. Connor, and G. Rzevski Jul. 1981 211 p refs
(Contract MIN-DEF-MW22B/640)
(BAe-ST-25358; BR49564) Copyright. Avail: Issuing Activity

The reliability of microprocessor systems is investigated and the key problem areas are identified. Basic concepts such as failure, error, reliability, robustness and integrity are defined. The dependance of system failure on system specification, on time and on modes of system utilization are examined. The faults caused by human errors, manufacturing, wearout and overstressing are discussed. The influence of technology and radiation effects is also investigated and reliability evaluation and improvement methods are analyzed. It is shown that existing terminologies are not mutually compatible, that human errors are the major cause of unreliability, that whenever systematic software design methods are used highly reliable cost effective software results, that the potential benefits to be gained from the use of fault tolerance techniques are considerable and that standard reliability prediction techniques for microelectronic devices are unsatisfatory. Author (ESA)

N83-26499# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
COMPUTER PROJECT OF UNCONVENTIONAL PACKAGES [USO DE COMPUTADOR PARA O PROJETO DE EMBALAGENS DE FORMA NAO CONVENCIONAL]
Luiz Alberto Vieira Dias and Nandamudi L. Vijaykumar Apr. 1983 8 p refs In PORTUGUESE; ENGLISH summary Presented at the 1st Natl. Congr. of Ind. Automation, Sao Paulo, Brazil
(INPE-2713-PRE/300) Avail: NTIS HC A02/MF A01

The need of designing nonconventional packages for industry is frequent. With the advent of Applied Mathematics Techniques for computer usage trial and error methods are avoided. Using numerical integration and spline interpolation, internal volumes and external dimensions may be computed interactively. The final result may be presented in graphical form, using a traditional PLOTTER. Two examples are presented to illustrate this technique. Author

N83-26500# Naval Postgraduate School, Monterey, Calif.
TEMPOA: AN INTERACTIVE SIMULATION FOR THE APPLE 3 MICROCOMPUTER M.S. Thesis
Christopher D. Owens Oct. 1982 128 p refs
(AD-A124656) Avail: NTIS HC A07/MF A01 CSCL 09/2

TEMPOA is a computer interactive version of the original General Electric TEMPO game, and is written for the Apple III microcomputer. A minimum of two players vie for a strategic win through judicious budgetary planning in the development and procurement of realistic weapon systems. All decisions are subject to the constraints of limited budgets, hardware inventories, research and development time lags and the uncertainties of war and inflation. A third party, assuming the role of game umpire, selects all simulation parameters and oversees the play of the game. Author (GRA)

N83-26501# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DEVELOPMENT OF AN OCULOMETER DATA COLLECTION SUBSYSTEM M.S. Thesis
Nancy Lillian Wood Dec. 1982 259 p refs
(AD-A124700; AFIT/GE/EE/82D-72) Avail: NTIS HC A12/MF A01 CSCL 09/2

A SYM-1 microprocessor with dual 5-1/4 inch disk drives was used to develop software to gather and reduce data from a Cubic-Foot Remote Oculometer built by Honeywell, Inc. The primary function of the oculometer is to measure the look direction of a pilot's eye in a ground cockpit simulator. The output of the oculometer used for this effort is eye lookpoint in azimuth and elevation and whether the oculometer is tracking the eye or not. The line-of-sight measurement covers a viewing field of plus and minus 30 degrees in azimuth and zero to plus 30 degrees in elevation. This viewing field is broken into instruments whose boundaries are defined by the data collection subsystem. Performance measures are printed out at the end of the data mission. The software for the SYM-1 was developed modularly with each module tested separately and then the whole subsystem tested. Simulated oculometer data was used to test the software. The data collection subsystem was designed to run with minimal knowledge and interaction required by the user. GRA

N83-26502# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DESIGN OF A MULTIPROCESSING OPERATING SYSTEM FOR SIXTEEN-BIT MICROPROCESSORS M.S. Thesis
Douglas S. Huneycutt Dec. 1982 193 p refs
(AD-A124733; AFIT/GCS/EE/82D-20) Avail: NTIS HC A09/MF A01 CSCL 09/2

The purpose of this investigation is to develop a multiprocessing operating system for sixteen-bit micro-computers. The AFIT Multiprocessing Operating System (AMOS) is based on state-of-the-art software and hardware technology. AMOS has been designed to be implementable on any of the current powerful microprocessors. The Zilog Z8000 single chip microprocessor was chosen for the initial implementation due to its advanced architecture and architectural similarity to popular minicomputer processors. GRA

N83-26503# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A MINICOMPUTER IMPLEMENTATION OF A DATA MODEL INDEPENDENT, USER-FRIENDLY INTERFACE TO DATABASE M.S. Thesis
Michael D. Guidry 15 Dec. 1982 83 p refs
(AD-A124719; AFIT/GCS/EE/82D-16) Avail: NTIS HC A05/MF A01 CSCL 05/8

An interface system was proposed that would give the user the ability to query a database, regardless of the host data base management systems, as long as the user's computer could communicate with the database's host computer. Investigations were made into existing query resolution systems, and query definition structures and universal data manipulation languages were researched. With this background, a base query resolution system was chosen, and additional capabilities for an improved final query definition structure and a universal data manipulation language were proposed. In this project, the syntactic analysis part of the query resolution system was implemented. The use of the improved final query definition structure within the query resolution system was defined, and a high level design of the UNIVERSAL-DML (including a pseudo-code representation of the resultant application program) is presented. Author (GRA)

N83-26504# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
VIDEO DIGITIZATION OF DISPLACEMENT/GRADIENT DATA FROM OPTICAL INSTRUMENTATION SYSTEMS M.S. Thesis
David R. Chaffee Dec. 1982 113 p refs
(AD-A124751; AFIT/GAE/AA/82D-5) Avail: NTIS HC A06/MF A01 CSCL 09/2

Optical data acquisition systems involve such techniques as schlieren, interferometry, shadowgraphs, and a form of laser interferometry known as time averaged holography. Through the use of these tools, data can be obtained from fluid flow fields, structural tests of materials, or other items without any physical interference of the flow stream or test article. Unfortunately, the reduction of raw data from these systems can be extremely tedious, time-consuming, and often times inaccurate due to readability problems. Video digitization offers an efficient and reasonably accurate method for converting optical information into digital data and allowing immediate reduction to yield useful engineering results. Free convective heat transfer interferograms are digitized and the data reduced on the same microcomputer system. Results from this data compare favorably to those using a microcomparator digitizer. Time averaged holograms from a vibration rig are reduced with the video processor. These results are also favorable when compared to similar data taken with an optical comparator. Displacement and bending strain plots are overlaid using both data sets and show excellent correlation. Recommendations are made for expanding and improving the digitizer so that it may achieve its full potential. GRA

N83-26505# Illinois Univ., Urbana. Coordinated Science Lab.
REALIZING A LARGE MEMORY SPACE ON A MICROPROCESSOR SYSTEM
Elmer Frederick Pflug, III Jul. 1980 74 p refs
(Contract N00014-79-C-0425)
(AD-A123946; R-887; UILU-ENG-80-2219) Avail: NTIS HC A04/MF A01 CSCL 09/2

The memory space of current microprocessors is limited by the number of address bits inherent in the architecture. Several applications of microprocessors require large addressing space, for example, in multiple microprocesor systems with a single shared memory. This research is focused on obtaining cost-effective ways to achieve a large addressing space. Several different ways are suggested for this purpose. Applicability of these results to three real microprocessors is discussed. The microprocessors discussed are Intel 8080, Zilog Z80 and Motorola 6800. It is concluded that Intel 8080 and Z80 can address a large memory space with very little additional hardware, while Motorola 6800 requires much more hardware. A large memory is usually implemented as two-level hierarchy for reasons of cost-effectiveness. This research also focusses on the ways to organize a two-level virtual memory system for microprocessors. It is concluded that current microprocessors require a large amount of external hardware to support a virtual memory system. Even with this additional hardware, the virtual memory system is not as general as in large computer systems. The restrictions imposed on the system to correctly support a virtual memory system on a microprocessor are also discussed. Author (GRA)

N83-26506# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
APPLICATIONS DIRECTED MICROPROGRAMMING ON A MINICOMPUTER SYSTEM M.S. Thesis
Gary A. Schoon Dec. 1982 177 p refs
(AD-A124853; AFIT/GCS/EE/82D-31) Avail: NTIS HC A09/MF A01 CSCL 09/2

The use of microprogramming to improve the performance of application programs was investigated. The user microprogrammable Hewlett-Packard (HP) 21MX minicomputer was used for the investigation. Two application programs were chosen as candidates for microprogramming, a wind tunnel stress analysis program and a laser materials modeling program. The programs were analyzed to determine where microprogramming should be applied using an activity profile generator program. The microcode for the programs was implemented, and the speed improvement measurements of the resultant programs were made. The study further looked at the easibility of automating the microprogramming tuning process on the HP 21MX computer. Approaches to automatically selecting program segments for microprogramming and automatically synthesizing the microcode were discussed. GRA

N83-26507# Federal Compiler Testing Center, Falls Church, Va. Office of Software Development.
MICROSOFT, INC., IBM PERSONAL COMPUTER, COBOL-86 VERSION 1.00 COBOL Technical Report
31 Aug. 1982 13 p
(PB83-152603; OSD/FSTC-82/178) Avail: NTIS HC A02/MF A01 CSCL 09B

This FCTC Technical Report for the MICROSOFT INC., Microsoft COBOL-86 V1.00 running under the Microsoft PCDOS Version 1.10 provides a consolidated summary of the results obtained from the evaluation of the subject compiler against the Indexed I-O, Level I of the 1974 COBOL Standard (X3.23-1974/ FIPS PUB 21-1). This technical report is made up of several sections showing all the descrepancies found - if any. A companion report Validation Summary Report OSD/FSTC-82/176 provides information regarding the validation of the compiler as the Low Intermediate level of Federal Standard COBOL (FIPS PUB 21-1). GRA

N83-26508# Federal Compiler Testing Center, Falls Church, Va. Office of Software Development.
MICROSOFT, INC., IBM PERSONAL COMPUTER, COBOL-86 VERSION 1.00 Validation Summary Report
31 Aug. 1982 48 p
(PB83-152595; OSD/FSTC-82/176) Avail: NTIS HC A03/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the Microsoft Inc., Microsoft COBOL-86 V1.00 running under the Microsoft PCDOS Version 1.10 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the Low-Intermediate level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies by level/ module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N83-26509# Federal Compiler Testing Center, Falls Church, Va. Office of Software Development.
MICRO FOCUS LTD., INTEL MDS 231 (8080A), CIS COBOL V.4.5 REV. 1 Validation Summary Report
31 Aug. 1982 53 p
(PB83-155796; OSD/FSTC-82/160) Avail: NTIS
HC A04/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the MICRO FOCUS LTD., CIS COBOL V. 4.5 Rev. 1 running under the CP/M Version 2.2 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the LOW-INTERMEDIATE level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found -if any. These include an overview of the validation which lists all categories of disrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N83-26510# Federal Compiler Testing Center, Falls Church, Va. Office of Software Development.
CII HONEWELL BULL, LEVEL 64 DPS7, COBOL-74 V-55.118 Validation Summary Report
29 Jul. 1982 73 p
(PB83-116616; OSD/FSTC-81/133) Avail: NTIS
HC A04/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the CLL Honeywell Bull, COBOL V-55.118 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the High level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found -if any. These include an overview of the validation which lists all categories of discrepancies by level/ module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N83-26511# Federal Compiler Testing Center, Falls Church, Va. Office of Software Development.
HONEYWELL INFORMATION SYSTEMS, LEVEL 6 MODEL 47, ADVANCED FORTRAN RELEASE 2.0 Validation Summary Report
25 Aug. 1982 23 p
(PB83-147595; OSD/FSTC-82/200) Avail: NTIS
HC A02/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the Honeywell Information Systems, Advanced FORTRAN Release 2.0 running under the MOD 400 Release 3.0 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 FORTRAN Standard F(X3.9-1978/FIPS PUB 69). The compiler was validated against the Full Language FORTRAN level of FIPS PUB 69. The VSR is made up of several sections showing all the discrepancies found -if any. These include an overview of the validation which lists all categories of discrepancies within X3.9-1978, and a detailed listing of discrepancies together with the tests which failed. GRA

N83-26512# Federal Compiler Testing Center, Falls Church, Va. Office of Software Development.
PERKIN-ELMER SYSTEM 3220, COBOL R06 Validation Summary Report
1 Sep. 1982 54 p
(PB83-147611; OSD/FSTC-82/121) Avail: NTIS
HC A04/MF A01 CSCL 09B

The Validation Summary Report (VSR) for the PERKIN-ELMER, COBOL R06 running under the OS/32 R06-01 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/ FIPS PUB 21-1). The compiler was validated against the LOW-INTERMEDIATE level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found -if any. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N83-26513# Federal Compiler Testing Center, Falls Church, Va.
FEDERAL CONVERSION SUPPORT CENTER CONVERSION COST MODEL (VERSION 2)
1 Jun. 1982 121 p refs
(PB83-149641; GSA/FCSC-82/001) Avail: NTIS
HC A06/MF A01 CSCL 09B

The second version of the FCSC conversion cost model based upon extensive conversion cost estimating and analysis over the last twelve months is presented. Several significant changes were made to the FCSC baseline conversion tasks and the FCSC conversion cost model (version 1), especially in the areas of test data generation and validation and acceptance testing. Also, the guidelines in other areas such as site preparation and system transition were greatly expanded. The model was designed to allow the user to make simplifying assumptions so that estimates with initial data can be derived very early in the conversion planning process. GRA

N83-26514# Federal Compiler Testing Center, Falls Church, Va. Office of Software Development.
MICROSOFT INCORPORATED, ZENITH DATA SYSTEMS, Z80, COBOL-80 VERSION 4.63 Validation Summary Report
31 Aug. 1982 48 p
(PB83-150706; OSD/FSTC-82/175) Avail: NTIS
HC A03/MF A01 CSCL 09B

This validation Summary Report (VSR) for the MICROSOFT INC., Microsoft COBOL-80 V4.63 running under the Digital Research CP/M-80 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the Low-Intermediate level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found -if any. These include an overview of the validation which list all categories of discrepancies by level/module within X3.23- 1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N83-26515# Federal Compiler Testing Center, Falls Church, Va. Office of Software Development.
FOUR-PHASE SYSTEMS, INC., IV/90 MOD II, COBOL '74 RELEASE BE06 Validation Summary Report
31 Aug. 1982 52 p
(PB83-150722; OSD/FSTC-82/215) Avail: NTIS
HC A04/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the Four Phase Systems, Inc., COBOL '74 Release BE06 running under the MFE/IV Release BN06 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the Low-Intermediate level of FIPS PUB 21-1. The VSR is made up of several sections showing all the

discrepancies found -if any. These include an overview of the validation which lists all categories of discrepancies by level/module within X23.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N83-26516# Federal Compiler Testing Center, Falls Church, Va. Federal Software Testing Center.
FOUR-PHASE SYSTEMS, INCORPORATED, IV/90, MOD II, COBOL '74 RELEASE BE06 COBOL Technical Report
31 Aug. 1982 13 p
(PB83-150730; OSD/FSTC-82/216) Avail: NTIS HC A02/MF A01 CSCL 09B

This FCTC Technical Report for the Four-Phase Systems, Inc., COBOL '74 Release BE06 running under the MFE/IV, Release BN06 provides a consolidated summary of the results obtained from the evaluation of the subject compiler against the Indexed I-0, Level 1 of the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). This technical report is made up of several sections showing all the descrepancies found -if any. A companion report Validation Summary Report FSTC-82/215 provides information regarding the validation of the compiler as the Low-Intermediate level of Federal Standard COBOL (FIPS PUB 21-1). GRA

N83-26517# National Bureau of Standards, Washington, D.C.
AN ANNOTATED BIBLIOGRAPHY OF INTRODUCTORY ARTICLES TO AID IN THE SELECTION OF SMALL COMPUTER SYSTEMS
Lynne Rosenthal and John Barkley Aug. 1982 20 p refs
(PB83-134502; NBSIR-82-2573) Avail: NTIS HC A02/MF A01 CSCL 09B

A bibliography of 66 references on personal computers is presented. Software, hardware, auxiliary equipment, and communication topics are represented. GRA

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N83-26518 Royal Signals and Radar Establishment, Malvern (England).
SOFTWARE COST ESTIMATING
M. Stanley 13 May 1982 54 p refs
(RSRE-MEMO-3472; BR84024) Copyright. Avail: Issuing Activity

The reasons why software cost estimating is error prone are discussed, and a number of different strategies for software cost estimating inherent in published models of the software development process are examined. A total of 19 published models are considered. Most of these models have very limited applicability and only three were selected for further analysis: PRICE-S, SLIM and JPL. Author (ESA)

N83-26519 Royal Signals and Radar Establishment, Malvern (England).
THE ADA/APSE: A SUCCESSOR TO CORAL 66 IN THE 1980'S
T. A. D. White Jan. 1983 23 p refs
(RSRE-MEMO-3540; BR87073) Copyright. Avail: Issuing Activity

The historical context of, and the features offered by, the standard real-time language, CORAL 66, and the recently developed US DoD standard language for embedded systems, Ada are described. The principles behind the development of the Ada programming Support environment (APSE) are also sketched. Ada/APSE, will almost certainly replace CORAL 66 as the UK Ministry of Defense preferred language in the mid- to late-80s. The Ministry of Defense preferred software design method MASCOT, and its role after a transition to Ada/APSE is explained. Author (ESA)

N83-26520 Royal Signals and Radar Establishment, Malvern (England).
THE DISCUS OPERATING SYSTEM
M. P. Griffiths Nov. 1982 83 p refs
(RSRE-82009; BR86681) Copyright. Avail: Issuing Activity

The system software for the distributed control microprocessor system (DISCUS) is described. The operating system procedures are detailed, together with the use of specially developed translator programs to assist in the process of system generation. Techniques for splitting a task into its component functional parts, each function running on its own separate microcomputer, are also described. The structure of a function is discussed, and ideas are presented to show how a function may be written so as to take the maximum advantage of a distributed architecture and also to achieve recovery in the event of a fault. Author (ESA)

N83-26521 British Aerospace Dynamics Group, Stevenage (England). Dynamics Group.
COMPUTER AIDED DESIGN AT STEVENAGE
N. Eastman and M. G. Brown Jan. 1982 22 p
(BAe-ST-26148) Avail: Issuing Activity

Computer aided design (CAD) facilities in engineering are described including plans for their extension in the immediate future. An Integrated CAD/CAM (Computer aided manufacturing) system is outlined. A cost - benefit examination is attempted. Author (ESA)

N83-26522 British Aerospace Dynamics Group, Stevenage (England). Reliability Technology Dept.
SOFTWARE RELIABILITY EVALUATION METHODS
C. J. Dale Sep. 1982 36 p refs
(BAe-ST-26750) Copyright. Avail: Issuing Activity

Methods for predicting and estimating software reliability were studied, identifying on theoretical grounds those methods worthy of further study. This is followed by a practical, data-oriented evaluation of selected methods. The eventual aim is to produce a model (or small number of models) which will be useful in the prediction and evaluation of the reliability of the increasing number of products which have a significant software content. The methods are organised in order of popularity: the most referenced methods appear at the beginning, and those with fewer references towards the end. A summary chart is included which gives an outline of the nature of each model. Author (ESA)

N83-26523# Los Alamos Scientific Lab., N. Mex.
EVENT USER'S MANUAL: A COMPUTER CODE FOR ANALYZING EXPLOSION-INDUCED GAS-DYNAMIC TRANSIENTS IN FLOW NETWORKS
P. K. Tang, R. W. Andrae, J. W. Bolstad, and W. S. Gregory Jan. 1983 88 p refs
(Contract W-7405-eng-36)
(LA-9624-M) Avail: NTIS HC A05/MF A01

This report contains supporting information for the computer code EVENT, which can predict explosion-induced gas-dynamic transients in flow networks. The code is capable of analyzing transients in any arbitrarily designated interconnections in a network of building rooms and ventilation systems. The EVENT code is designed to provide improved methods of safety analysis for the nuclear, chemical, and mining industries. A lumped-parameter formulation is used. This version of the EVENT code is particularly suitable for calculating the detailed effects of explosions in the far field using a parametric representation of the explosive event. The input for the code and a sample problem that illustrates the code's capabilities are provided. Author

N83-26524*# Business and Technological Systems, Inc., Seabrook, Md.
USER'S GUIDE FOR THE PRECISION RECURSIVE ESTIMATOR FOR EPHEMERIS REFINEMENT (PREFER)
Bruce P. Gibbs Mar. 1982 141 p refs
(Contract NAS5-26807)
(NASA-CR-170506; NAS 1.26:170506; BTS-FR-82-181) Avail: NTIS HC A07/MF A01 CSCL 09B

PREFER is a recursive orbit determination program which is used to refine the ephemerides produced by a batch least squares program (e.g., GTDS). It is intended to be used primarily with GTDS and, thus, is compatible with some of the GTDS input/output files. L.F.M.

N83-26525# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
THE LANAC-2 LANGUAGE FOR CONCURRENT PROGRAMMING AND ITS OPERATIONAL SUPPORT [A LINGUAGEM LANAC-2 PARA PROGRAMACAO CONCORRENTE E SEU SUPORTE OPERACIONAL]
Ladislau Jose Nave daSilva, Sergio Donizetti Fischer, Vania Aparecida Dinardo Oleinki, and Celso RennaeSouza Apr. 1983 10 p refs In PORTUGUESE; ENGLISH summary Presented at the 1st Natl. Congr. on Ind. Automation, Brazil, 11-15 Jul. 1983
(INPE-269-PRE/295) Avail: NTIS HC A02/MF A01

The Algol-like programming language LANAC/II and its Kernel are presented. The language was developed at INPE/CNPq to be applied in real time systems. Author

N83-26526# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
LANAC PROGRAMS OPERATIONAL SYSTEMS SUPPORT KERNEL M.S. Thesis - 17 Sep. 1982 [CERNE (KERNEL) DE SISTEMA OPERACIONAL PARA SUPORTE DE PROGRAMAS EM LANAC]
Ladislau Jose Nave daSilva Mar. 1983 102 p refs In PORTUGUESE; ENGLISH summary
(INPE-2676-TDL/123) Avail: NTIS HC A06/MF A01

An operating system kernel for the DEC PDP-11/10 computer is presented, supporting the execution of LANAC programs. LANAC is a language for process control and dedicated data acquisition systems development, that involves real time resource management and contains multiprogramming facilities. The kernel, which is in operation, controls the concurrent process scheduling, based on process priorities; executes sychronizing operations among processes; and manages the data, control signals and state information transfers between processor and peripherals. Author

N83-26527# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DEVELOPMENT OF AN INTERACTIVE CONTROL ENGINEERING COMPUTER ANALYSIS PACKAGE (ICECAP) FOR DISCRETE AND CONTINUOUS SYSTEMS, VOLUME 1 M.S. Thesis
Charles J. Gembarowski Dec. 1982 171 p refs
(AD-A124707; AFIT/GE/EE/82D-34-Vol-1) Avail: NTIS HC A08/MF A01 CSCL 09/2

This thesis reports on an effort to design and implement a modern interactive computer-aided design and analysis package for control systems. This package applies to discrete and continuous time systems. The thesis effort continues the effort begun by Captain Glen T. Logan who used a control engineering design and analysis computer program called TOTAL as his starting point. This thesis project uses top-down structured analysis and programming techniques to define the new program called ICECAP (Interactive Control Engineering Computer Analysis Package). A user-oriented command language forms the basic structure of ICECAP. On-line assistance is provided to the user. The program makes use of CRT (Cathode Ray Tube) terminals with a limited graphics capability to improve the user environment. The program structure allows features to be added in a modular fashion so that others can continue the effort. Emphasis was placed on implementing the continuous time functions first. Author (GRA)

N83-26528# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DEVELOPMENT OF AN INTERACTIVE COMPUTER GRAPHICS SYSTEM LIBRARY AND GRAPHICS TOOLS M.S. Thesis
Kevin Wilson Rose Dec. 1982 123 p refs
(AD-A124694; AFIT/GE/EE/82D-58) Avail: NTIS HC A06/MF A01 CSCL 09/2

The requirements for a general purpose, interactive graphics software system were investigated and led to the development of a graphics library of subroutines which can be used as a graphics research tool or for applications development. The design objectives for software environments and software tools established the strategy for developing the graphics software library. It was determined that the ACM Core standard graphics specification satisfied many of the requirements. An output-only implementation of the Core by George Washington University was extended to include a device driver for a color display device and the synchronous input primitives. The graphics system was used to develop an application program to demonstrate the design of an effective user-tool interface. The program is an interactive graphics editor that allows preparation of two-dimensional pictures and includes capabilities for picture storage and retrieval, segment addition and deletion, attribute control, error handling and on-line help. The graphics software library implemented to the specification of the Core standard proposal provides an effective tool for interactive computer graphics education, research, and applications development. Author (GRA)

N83-26529# Royal Aircraft Establishment, Farnborough (England).
MODIFICATION OF SAVANT TO RUN ON THE PDP RSX-11M OPERATING SYSTEM
R. J. Bluff and P. T. May Jan. 1982 112 p
(AD-A124608; RAE-TM-FS(F)452; BR85532) Avail: NTIS HC A06/MF A01 CSCL 09/2

SAVANT (System Architecture Verification and Analysis Technique) is a computer program developed specifically to investigate the feasibility of an avionic system design, in terms of problems such as completeness and consistency. The program was originally developed on a Prime 300 computer system. This Memorandum describes alterations and modifications of SAVANT, to enable it to be used on PDP 11 RSX-11M operating system. Author (GRA)

N83-26530# Battelle Columbus Labs., Ohio.
COMPUTER AIDED DESIGN AND MANUFACTURING (CAD/CAM) TECHNIQUES FOR OPTIMUM PREFORM AND FINISH FORGING OF SPIRAL BEVEL GEARS, PHASE 2 Final Report, 1 Apr. 1981 - 1 May 1982
A. Badawy, T. Altan, D. Ostberg, J. R. Douglas, and G. Horvat Warren, Mich. Army Tank Automotive Research and Development Command Oct. 1982 116 p refs
(Contract DAAK30-79-C-0071)
(AD-A124578; TACOM-TR-12663) Avail: NTIS HC A06/MF A01 CSCL 13/9

In Phase II of this program, spiral bevel gear forging dies were designed and manufactured using the CAD/CAM technique, developed in Phase I. Three series of forging trials were conducted. During the first series of trails, the technological aspects of the forging procedure such as heating, lubrication, billet temperature and cooling were established. During the second series of forging trials 20 gears were forged with a 0.007 inch machining allowance on both sides of the tooth surfaces. These near net forged gears were subsequently machined with a single machining operation using a Gleason spiral gear cutting machine. The third series of trials were conducted to forge 20 gears with net teeth dimensions. The dimensional accuracy of the forged gears were evaluated using a computer controlled coordinate measuring machine, manufactured by Zeiss of W. Germany. The results of these measurements illustrated that the teeth dimensions of forged gears were within the tolerances expected and as predicted by the CAD/CAM techniques, developed in this program. This project was successful in: (a) developing the methodology of CAD/CAM procedures for manufacturing the dies (via EDM) for forging spiral bevel gears. (b) demonstrating that precision forging of spiral bevel gears is a practical production technique. GRA

N83-26531# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Computer Science Industrial Engineering/Operations Research.
SOFTWARE TOOLS FOR VOICE RECOGNITION RESEARCH
John W. Hoernemann, Joseph F. Maynard, and Beverly H. Williges

Nov. 1982 91 p refs
(Contract N00014-81-K-0143; RR0420901; NR Proj. SRO-101)
(AD-A124447; CSIE-82-11) Avail: NTIS HC A05/MF A01 CSCL 09/2

This report describes software tools provided to interface an Interstate Electronics Corporation Voice Recognition Module (VRM) to a VAX 1/780 computer. The purpose of the tools is to provide a flexible and easy to use set of software modules for experimenters to implement VRM host functions in various task environments. Software to provide analysis of recognition data is also presented. These statistics aid experimenters in developing vocabularies for various implementations of voice input. The voice input hardware and software tools are being used to explore the use of voice as a component of human/computer dialogues. Author (GRA)

N83-26532# Naval Ship Research and Development Center, Bethesda, Md. Computation Mathematics/Logistics Dept.
B7700 NETED REFERENCE MANUAL Final Report
David V. Sommer and Edwin L. Zivi, Jr. Nov. 1982 147 p
(AD-A124399; DTNSRDC/CMLD-82/27) Avail: NTIS HC A07/MF A01 CSCL 09/2

B7700 NETED Reference Manual describes the NETED text editor, used for preparing computer programs, data files, documents and other publications. Each of the 115 NETED commands is described on a separate page, as well as in a cross-referencing summary by function. A discussion of the history of NETED as well as its many features, a sample annotated session and a list of all diagnostics messages are included. GRA

N83-26533# Rome Air Development Center, Griffiss AFB, N.Y.
USING SREM TO SPECIFY COMMAND AND CONTROL SOFTWARE REQUIREMENTS
William E. Rzepka Dec. 1982 25 p refs
(AF Proj. 5581)
(AD-A124429; RADC-TR-82-319) Avail: NTIS HC A02/MF A01 CSCL 09/2

This report briefly describes command and control systems and the documentation standards currently used to specify their embedded computer software requirements. The Software Requirements Engineering Methodology (SREM) appears to satisfy these documentation standards. However, the original SREM design did not specifically address command and control needs, thereby leaving uncertain the exact extent of the SREM's capabilities to specify problems unique to this domain. To resolve this issue, the SREM is used to specify the software requirements for a small, but representative, command and control problem. The results show that, in general, SREM is capable of specifying command and control software requirements, but that certain problems exist. Some of the problems are easily resolved using the self-extension mechanisms of SREM, but other problems are sufficiently serious to warrant further investigations involving full-scale command and control systems. Author (GRA)

N83-26534# California Univ., Davis. Signal and Image Processing Lab.
STOCHASTIC IMAGE MODELS AND APPLICATIONS Final Report, 28 Sep. 1978 - 30 Jun. 1982
Anil K. Jain Dec. 1982 20 p
(Grant DAAG29-78-G-0206)
(Ad-A124420; ARO-16222.10-EL; SIPL-82-15) Avail: NTIS HC A02/MF A01 CSCL 12/1

Research is reported in the following areas: (1) Stochastic Image Modeling, (2) Image data Compression, (3) Spectral Estimation and Signal Extrapolation, and (4) Fast Algorithms. Author (GRA)

N83-26535# Virginia Polytechnic Inst. and State Univ., Blacksburg. Computer Science Industrial Engineering and Operations Research.
VALIDATION IN ADA PROGRAMMING SUPPORT ENVIRONMENTS
Dennis Kafura, J. A. N. Lee, Timothy Lindquist (Mitre Corp., McLean, Va.), and Thomas Probert Dec. 1982 69 p refs
(Contract N00014-81-K-0143; RR0420901)
(AD-A124765; CSIE-82-12) Avail: NTIS HC A04/MF A01 CSCL 09/2

To this date validation has been applied in only two areas, in the validation of programs and the validation of compilers, and then not to any degree which can truly be classified as more than empirical. This study was established to investigate the steps which would be needed to extend those previous experiences into the realm of programming environments and in particular the environments being proposed for use in the Ada program. A model of such environments already exists but is found to be lacking in essential detail necessary for an implementation to prescribe a model by which validation can be specified. This report does not itself provide any details of specific validation procedures or mechanisms, but rather investigates the processes for Ada Programming Support Environment (APSE) implementation in terms of the Ada Programming Language, and uses those specifications to suggest a mechanism for validation suite development. Further in order to accomplish these goals it is suggested that the conceptual model of the STONEMAN document be extended to express the wider computing environments in which the APSE would reside. This extend model would also provides a fundamental basis for the design of Ada systems which respond to the need to provide networking, distributed processing and security enclaves. Author (GRA)

N83-26536# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
IMPLEMENTATION OF SOFTWARE FOR A MICROCOMPUTER BASED MOSSBAUER SPECTROMETER M.S. Thesis
Bruce E. Pate Mar. 1982 82 p refs
(AD-A124782; AFIT/GNE/PH/82M-11) Avail: NTIS HC A05/MF A01 CSCL 09/2

Computer analysis of Mossbauer spectra using a microcomputer requires tight controls on memory requirements and programming techniques. A FORTRAN IV program, MOSFUN, was programmed into an PDP-11 microcomputer. The program was modified to calculate the velocity for a data point using the least sqaures fit of counts from a Moire interferometer and to perform an alphanumeric plot of the original data and the theoretical fitted spectrum. Spectra are obtained for absorbers of potassium ferrocyanide, natural iron, sodium nitroprusside, and neodynium cobalt. These spectra were then analyzed with the MOSFUN program and the results compared with analyses done with the former program, GENFIT, and with published values. Results showed MOSFUN to be more flexible easier to adapt, and easier to control during the evaluation of spectra, while still providing results that agreed within 1% of those obtained with GENFIT and with standard values. M.G.

N83-26537# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
IMPLEMENTATION OF A GRID-BASED LINE-DRAWING QUANTIZATION SYSTEM M.S. Thesis
Jerry N. Peery Dec. 1982 59 p refs
(AD-A124742; AFIT/GE/EE/82D-53) Avail: NTIS HC A04/MF A01 CSCL 12/1

The object of this thesis is to develop a system that can be used to implement and evaluate various grid intersect codes. Grid intersect codes are used in line drawing quantization schemes which provide specialized methods for encoding drawings which consist solely of thin lines on a contrasting background. Examples of such drawings include weather maps, blue prints, and English text. The system will consist of a NOVA 1200 computer and digitizer. The digitizer consists of a sketch pad, a pen, and the electrical circuitry to determine the location of the pen relative to the sketch pad. The position of the pen is converted to digital information that is used as the input to the computer. The computer can use this data to implement various grid intersect algorithms. This thesis discusses the design of the interface of these separate components into a system. Author (GRA)

N83-26538# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
SCENE ANALYSIS: NON-LINEAR SPATIAL FILTERING FOR AUTOMATIC TARGET DETECTION M.S. Thesis
James H. Cromer Dec. 1982 169 p refs
(AD-A124788; AFIT/GE/EE/82D-26) Avail: NTIS HC A08/MF A01 CSCL 17/8

This work focuses on a method for two-dimensional pattern recognition. The method includes a global search scheme for candidate windows of interest, based on Fourier domain cross-correlation. A method to normalize the input scene by local rectangular regions, in an attempt to efficiently approximate search window normalization, is presented. Also developed is a candidate window (potential target) similarity measure, based on the normalized L1 and Euclidean distances, which is independent of the template DC value and its energy. Observations on the performance of the algorithm applied to visual spectrum photographs of tanks in a realistic environment are included. Also included is the software to implement the algorithm on a Data General Eclipse S/250 minicomputer. Author (GRA)

N83-26539# Naval Postgraduate School, Monterey, Calif.
GP-GN: AN APPROACH CERTAIN TO LARGE-SCALE, MULTIOBJECTIVE INTEGER PROGRAMMING MODELS
James P. Ignizio Dec. 1982 36 p refs
(AD-A123784; NPS55-82-033) Avail: NTIS HC A03/MF A01 CSCL 12/1

A large number of real world problems may be characterized via a multiobjective integer mathematical programming model. However, the solution to truly large-scale problems of such a type has been a difficult task. In this paper, we present a hybrid approach, combining generalized goal programming and generalized networks, for the modeling of such problems. Once such a model has generalized networks, for the modeling of such problems. Once such a model has been developed, it may then be possible to employ the solution procedures of generalized networks to efficiently obtain a solution - particularly if the resultant hybrid model is, fundamentally, a multiobjective generalized network. Author (GRA)

N83-26540# Naval Postgraduate School, Monterey, Calif. Dept. of Operations Research.
SOME COMPUTER ALGORITHMS TO IMPLEMENT A RELIABILITY SHORTHAND M.S. Thesis
Sadan Gursel Oct. 1982 60 p refs
(AD-A123781) Avail: NTIS HC A04/MF A01 CSCL 12/1

Under the assumption of constant failure rates it is possible to build a reliability shorthand which gives a simple, unified approach to reliability computations for systems in the presence of complications like support by shared spares or changes in the failures rates of surviving components when other components fail. The computational implementation of the shorthand depends upon the convolution of strings of exponentially distributed random variables. After reducing the system scenario to its shorthand format, one can use the programs that are given in the appendix to obtain numerical values for the reliability of the system. Author (GRA)

N83-26541# California Univ., Irvine.
SOFTWARE DEVELOPMENT METHODOLOGIES AND ADA. ADA METHODOLOGIES: CONCEPTS AND REQUIREMENTS, ADA METHODOLOGY QUESTIONNAIRE SUMMARY, COMPARING SOFTWARE DESIGN METHODS FOR ADA: A STUDY PLAN
Peter Freeman and Anthony I. Wasserman Nov. 1982 102 p
(AD-A123710) Avail: NTIS HC A06/MF A01 CSCL 09/2

This document rationalizes the need for the use of coherent software development methodologies in conjunction with Ada and its programming support environments (APSE's) and describes the characteristics that such methodologies should possess. It is recognized that software development, particularly for embedded systems, is increasingly done in the context of overall systems development, including hardware and environmental factors. While there is a strong need for integrated systems engineering, this document focuses on the software issues only. Emphasis is thus given to the process by which software is developed for Ada applications, not just with the language or its automated support environment. The development activity yields a collection of work products (including source and object versions of Ada programs). These work products are valuable not only through the development phase, but also through the entire lifetime of the system as modifications and enhancements are made to the system. GRA

N83-26542# Air Force Human Resources Lab., Brooks AFB, Tex.
THE REGRX: A COMPUTERIZED STEPWISE REGRESSION ALGORITHM WITH RESIDUAL ANALYSIS Final Report
Walter G. Albert, Janos B. Koplyay, and Larry K. Whitehead Feb. 1983 42 p refs
(AF Proj. 7719)
(AD-A123987; AFHRL-TP-82-40) Avail: NTIS HC A03/MF A01 CSCL 09/2

Regression analysis programs are commonly used to develop prediction systems for Air Force personnel research, e.g., a system for accurately predicting future job performance of enlisted individuals based on information obtained during their Air Force careers. This information might include such predictor variables as aptitude or ability test scores, biographical data, and physical attributes. Requirements for the development of such prediction systems within the technical programs of the Air Force Human Resources Laboratory (AFHRL) are numerous. REGRX, a stepwise regression algorithm with residual analysis, functions as a subroutine in the computer-based TRICOR utility correlation and regression system. The comprehensive statistical/mathematical methodology comprising REGRX has served as a powerful tool in the development of Air Force prediction systems. This paper contains the technical details that are necessary for the user to take complete advantage of the analytical capabilities of REGRX. This information includes an in-depth discussion of the REGRX mathematical/statistical methodology with associated computational formulas and printed output samples. Therefore, this document aids researchers in executing and interpreting the results of the REGRX subroutine. Author (GRA)

N83-26543# Battelle Columbus Labs., Ohio. Center for Tactical Computer Systems.
USING SELECTED FEATURES OF ADA: A COLLECTION OF PAPERS Final Report
Nico Haberman, John Nestor, Steven Shuman, David Loveman, Dewayne Perry (Pegasus Systems), and Brian Wichmann (National Physics Lab.) 9 Nov. 1982 229 p refs Prepared in cooperation with Carnegie Mellon Univ. and Massachusetts Computer Assoc., Inc., Wakefield
(Contract DAAG29-76-D-0100)
(AD-A124012) Avail: NTIS HC A11/MF A01 CSCL 09/2

The purpose of these papers is to further the understanding of how to use selected features of the Ada Programming Language in a proper manner as viewed by the authors. Six papers are presented in this document describing the use of packages, types, tasking, exceptions, low level language features, and real data types in the Ada language. Author (GRA)

N83-26544# Naval Ocean Research and Development Activity, Bay St. Louis, Miss. Ocean Sciences and Technology Lab.
GUIDELINES FOR CODING FORTRAN PROGRAMS Final Report
John J. Cornyn Jul. 1982 63 p refs
(AD-A124030; NORDA-41) Avail: NTIS HC A04/MF A01 CSCL 09/2

This document provides a set of conventions to be followed when writing FORTRAN programs. Enforcement of, and adherence to, these conventions should reduce problems in transferring programs to other computers, should lead to more readable programs, and should make programs more maintainable. For ease of reference, the guidelines have been arranged in the order that the subjects to which they apply would normally be covered in a FORTRAN reference manual. The final section shows in the text of a FORTRAN program both before and after applying the

guidelines. An appendix describes how to emulate with FORTRAN code the constructs of structured programming. Author (GRA)

N83-26545# Command and Control Technical Center, Washington, D. C.
GENERALIZED MONITORING FACILITY: USERS MANUAL
Barry Wallack and George H. Gero 1 Dec. 1982 156 p
(AD-A124071; CCTC-CSM-UM-246-82-CHG-3) Avail: NTIS HC A08/MF A01 CSCL 09/2

The Users Manual describes each of the program in the Generalized Monitoring Facility (GMF), discusses input options required to run each program, and provides sample outputs generated by each program. The Generalized Monitoring Facility is delivered on a FILSYS SAVE tape. A description of the software is presented in section 2. Installation procedures for the GMF Monitor and guidance on how to run GMF can be found in section 5 of this manual. GRA

N83-26546# Mitre Corp., Bedford, Mass.
TRANSFORM DECODING OF REED-SOLOMON CODES. VOLUME 1: ALGORITHM AND SIGNAL PROCESSING STRUCTURE
D. O. Carhoun, B. L. Johnson, and S. J. Meehan Nov. 1982 65 p refs 2 Vol.
(Contract F19628-81-C-0001; AF Proj. 7010; AF Proj. 7170)
(AD-A123953; ESD-TR-82-403-Vol-1; MTR-82788-Vol-1) Avail: NTIS HC A04/MF A01 CSCL 09/4

One of the continuing concerns of the Low Cost Electronics project is the application of new technology to the implementation of error-correcting codes for reliable data communication. Our interest stems from the need for low-cost hardware to implement error-correction codes that exhibit significant coding gain on interference-resistant communication channels. Previous studies of coding gain led us to concentrate work on the implementation of the Reed-Solomon class of generalized BCH codes. This class of codes, although well-suited to the correction of both isolated random errors and random error bursts because of its optimum distance properties, continues to be genuinely in need of efficient decoding algorithms implemented by low-cost hardware. This report discusses in detail a transform decoding algorithm and its hardware implications, for the Reed-Solomon codes, that offer major simplifications relative to the conventional BCH decoding algorithm. A fast algorithm for encoding and syndrome computation is described. Modification of the error location process to accommodate erasures is also described. Also discussed are hardware implementation issues with a summary of design features and parameters to be incorporated in a future set of programmable integrated circuits for decoding a large number of Reed-Solomon codes. GRA

N83-26547# Mitre Corp., Bedford, Mass.
TRANSFORM DECODING OF REED-SOLOMON CODES. VOLUME 2: LOGICAL DESIGN AND IMPLEMENTATION
B. L. Johnson, A. L. Bequillard, and S. J. Meehan Hanscom AFB, Mass. Electronic Systems Div. Nov. 1982 149 p refs
(Contract F19628-82-C-0001)
(AD-A123977; ESD-TR-82-403-Vol-2; MTR-8278-Vol-2) Avail: NTIS HC A07/MF A01 CSCL 09/4

This report describes the logic design and hardware implementation of an encoder and decoder for a large number of Reed-Solomon symbol error-correction codes. The logic implements a transform encoding and decoding algorithm that was previously described in Volume One. The hardware required to implement the critical steps in the encoding and decoding algorithm is described in depth. An analysis of the decoder's operational characteristics and hardware complexity is presented. A proof-of-concept breadboard configured with small-scale Schottky TTL components is also described. GRA

N83-26548# Performance Measurement Associates, Inc., Vienna, Va.
A COMPARISON OF THE ACCURACY AND COMPLETENESS OF PROBLEM SOLUTIONS PRODUCED BY EXAMPLE-SOLUTIONS AND PROGRAM CODE Technical Progress Report, 1 Sep. 1979 - 28 Feb. 1982
Edward M. Connelly Dec. 1982 149 p refs
(Contract N00014-79-C-0739; RR0420901; NR Proj. 196-161)
(AD-A124051; PMA-82-362) Avail: NTIS HC A07/MF A01 CSCL 09/2

Use of an inductive processor to convert example-solutions into implied logic resulted in errors of omission no different from that which occurs with use of program code; however, such a technique provided a significant reduction in errors of commission. Feedback-aids in conjunction with example-solutions enabled the programmer to engage in more complex problems with few errors of commission; those aids, to be most useful, need to include the implied logic. The feedback-aids that were optimal for the initial example-solutions were not suitable for the revision of incorrect example-solutions. In the population of programmers who participated in these experiments, the number of programming languages and the number of operating systems that the individual knew were established as the best predictors of success in developing example-solutions, as well as for writing program code. Author (GRA)

N83-26549# Massachusetts Univ., Amherst. Dept. of Computer and Information Science.
MULTILEVEL RELAXATION IN LOW LEVEL COMPUTER VISION
Frank Glazer 1982 42 p refs
(Contract N00014-82-K-0464; Grant NSF MCS-79-18209)
(AD-A124054; COINS-TR-82-30) Avail: NTIS HC A03/MF A01 CSCL 09/2

Much work in low level computer vision has involved the dense interpolation or approximation of sparsely-known or noisy data. A few examples are image smoothing, surface interpolation, and optic flow computation. A recent approach to these problems has formulated them in terms of optimization or constrained minimization. In general these techniques are equivalent to solving elliptic partial differential equations with boundary conditions and constraints. In either formulation, these problems can be solved by a class of algorithms well suited to computer vision. Variational (cost minimization) and local constraint approaches are generally applicable to problems in low-level vision (e.g., computation of intrinsic images). Iterative relaxation algorithms are natural choices for implementation because they can be executed on highly parallel and locally connected processors. They may, however, require a very large number of iterations to attain convergence. Multi-level relaxation techniques converge much faster and are well suited to processing in cones or pyramids. These techniques are applied to the problem of computing optic flow from dynamic images. GRA

N83-26550# Mitre Corp., Bedford, Mass.
CEDA USER'S MANUAL
J. R. Calabro and M. M. Pozzo Jan. 1983 122 p
(Contract F19628-82-C-0001; AF Proj. 496B)
(AD-A125183; ESD-TR-82-418; MTR-8658) Avail: NTIS HC A06/MF A01 CSCL 09/2

The Air Force is involved in research in the area of human performance and training; specifically, the interaction of human factors with the effectiveness of command and control systems. A software system which is a Capability for Evaluating Decision Aids (CEDA) was developed using the ESD CONCAP capability at MITRE. CEDA will be used by the Human Resources Laboratory for testing human performance on a tactical operations problem as the amount of information and form of presentation are varied. This document contains the specific instructions for operating CEDA. Author (GRA)

N83-26551# Melbourne Univ., Parkville (Australia). Dept. of Computer Science.
THEORETICAL ISSUES IN SOFTWARE ENGINEERING
Dick Hamlet (Maryland Univ.) Sep. 1982 32 p refs
(Contract F49620-80-C-0004; AF Proj. 2304)
(AD-A125013; AFOSR-83-0038TR) Avail: NTIS HC A03/MF A01 CSCL 09/2

The discipline of software engineering has transferred the common-sense methods of good programming and management to large software projects. It has been less successful in acquiring a solid theoretical foundation for these methods. The software development process has been divided into phases, each separating from programming some aspect for independent consideration. The division itself has no justification save practice that has evolved for large, concurrently processed programs. Furthermore, each phase needs formal description and analysis. We briefly describes the disciplines, gives its existing theoretical basis, and lists some problems that need theoretical work. Author (GRA)

N83-26552# Rockwell International Science Center, Thousand Oaks, Calif. Science Center.
NUMERICAL METHODS FOR 2-DIMENSIONAL MODELING Final Report, 1 Jul. 1980 - 30 Sep. 1982
W. D. Murphy, W. F. Hall, C. D. Maldonado, and S. A. Louie Feb. 1983 17 p refs
(Contracts MDA903-80-C-0498; DARPA Order 3984)
(AD-A125125; SC5271.12FR) Avail: NTIS HC A02/MF A01 CSCL 09/2

This document constitutes the final report on research in efficient numerical methods for two-dimensional VLSI process modeling. The major output of this work is embodied in the computer code MEMBRE (for Multidimensional Efficient Moving Boundary Redistribution) and the associated user's manual. This code predicts the two-dimensional dopant profiles which evolve during oxidation and drive-in, including those effects arising from formation of the bird's beak oxide profile and from concentration dependence of the diffusivity at high doping levels. Typical CPU (Central processing unit) times for a complete redistribution process, involving several thermal cycles, are found to range from two to ten minutes on the IBM 3033. In the final phase of the contract, modifications have been introduced in the basic code to increase the speed of solution for the more difficult cases (e.g., arsenic drive-in). A factor of two reduction in CPU time was to be achievable without deterioration in solution accuracy through the use of nonuniform spatial grids. MEMBRE has been made available on tape to the U.S. integrated circuits community in the form of a FORTRAN program executable on the IBM 3033. It contains the basic input/output routines from Standard's one-dimensional process code SUPREM, modified to deal with two-dimensional process data. Its capabilities have been described in presentations at two technical meetings and in article to appear in the new journal COMPEL. Eight requests for the code from integrated circuit manufacturers and researchers in the U.S. have been processed to date. Author (GRA)

N83-26553# Mitre Corp., Bedford, Mass.
SOFTWARE ACQUISITION PROCESS (SWAP) MODEL FY81 Final Report
O. Shapiro Dec. 1982 169 p refs
(Contract F19628-82-C-0001; AF Proj. 6820)
(AD-A125165; MTR-8524; ESD-TR-82-258) Avail: NTIS HC A08/MF A01 CSCL 09/2

The SWAP (Software Acquisition Process) Model is a software cost and schedule estimating tool that operates by simulating the acquisition process. Currently, SWAP simulates only the acquisition of embedded software in Full Scale Development. It can support more diverse usage. This report describes the Model's concepts, developmental approach, current status, and future plans, as of the completion of the second full year of its development. Author (GRA)

N83-26554# Maryland Univ., College Park. Lab. for Numerical Analysis.
FEARS USER'S MANUAL FOR UNIVAC 1100 Final Technical Note.
C. Mesztenyi and W. Sztmczak Oct. 1982 81 p
(Contract N00014-77-C-0623)
(AD-A125047; BN-991) Avail: NTIS HC A05/MF A01 CSCL 09/2

The FEARS program normally takes the problem's descriptive data from the run-stream. This input data is composed of the Geometry and of the Bilinear/Error matrices. Alternatively, this data can be read from a DUMP-file, which has been generated by a previous execution of FEARS. Once the initial data is read, FEARS enters into a command-mode. In the command-mode, the user must input a command (with some parameters) instructing the program about the next step to be taken. This mode allows the user to have complete control over the iteration process, step by step, reflecting the research nature of the program. On the other hand, the ITERATE command allows the iterations to be automatic. Once a STOP command is given, the run will be terminated. Printed output generated by FEARS consists of summary data after each iteration step. The user also has the option to reprint initial input and/or detailed information about the solution process during the iteration. The formats of these printouts are described. In addition, the DUMP command generates a dump-file of the data structure which can be used as input, either for FEARS itself, or for various postprocessors. Chapter 5 gives the computer dependent control statements necessary to run FEARS on the UNIVAC 1100 computer. The program is supplied with a dummy subroutine giving zero values for the bilinear matrices E and D. If these matrices are coordinate dependent, the user must supply the appropriate subroutine replacing the supplied dummy routine. This preparation must be performed prior to the use of FEARS. GRA

N83-26555# Mitre Corp., Bedford, Mass.
CEDA HIGH-LEVEL SOFTWARE SYSTEM DESIGN
J. R. Calabro and M. M. Pozzo Hanscom AFB, Mass. Electronic Systems Div. Jan. 1983 105 p
(Contract F19628-82-C-0001)
(AD-A125070; MTR-8651; ESD-TR-82-419) Avail: NTIS HC A06/MF A01 CSCL 09/2

The Air Force is involved in research in the area of human performance and training; specifically the interaction of human factors with the effectiveness of command and control systems is being studied. A software system which is a Capability for Evaluating Decision Aids (CEDA) was developed using the ESD CONCAP capability at MITRE. CEDA will be used by the Human Resources Laboratory for testing human performance on a tactical operations problem as the amount of information and form of presentation are varied. The paper is a high level description of the software design. It is assumed that the reader knows computer programming and the terms common to DEC's RSX-11M Operating System. Author (GRA)

N83-26556# European Space Agency, Paris (France).
DESCRIPTION OF A PROGRAM FOR KALMAN FILTERING AND RAUCH SMOOTHING TECHNIQUES APPLICABLE TO NONLINEAR SYSTEMS WITH CONTINUOUS EVOLUTION AND DISCRETE OBSERVATION MODELS
Claude Aumasson and Therese Cotillon Feb. 1983 126 p refs Transl. into ENGLISH of "Presentation d'un Code Numerique de Filtrage et de Lissage de Kalman-Rauch pour des Systemes non lineaires, a Evolution Continue et a Observation Discrete" ONERA, Paris Report ONERA-NT-1981-5, Chatillon, France, 1981 Original report in FRENCH previously announced as N82-24852
(ESA-TT-766; ONERA-NT-1981-5) Avail: NTIS HC A07/MF A01

The theory of Kalman filtering and Rauch smoothing when applied to dynamic systems whose evolution is governed by a nonlinear, continuous, differential equation and which are observed by a nonlinear discrete time equation is outlined. The FIKALM and LIRAUC subroutines which estimate the state and the characteristics of a dynamic system modeled by these equations are described. Automatic elimination of aberrant measurements, by comparing the predicted observation with the real observation, avoid preprocessing untreated measurements. The restoration, on smoothing, of a pseudocontinuous evolution noise, an observation residue and the estimation of their covariance matrices allows verification of the validity of the a priori evaluation of the noise levels on the evolution and observation. The trajectory and longitudinal attitude of an aircraft are estimated from radar observations. Author (ESA)

N83-26557# European Space Agency, Paris (France).
A FAST PLOTTING ALGORITHM FOR FINITE ELEMENT TYPE MESHES
Daniel Louis Mar. 1983 26 p refs Transl. into ENGLISH of "Un Algorithm de Trace Rapide d'un Maillage Type Elements Finis" ONERA, Paris Report ONERA-NT-1982-5, 1982 Original report in FRENCH previously announced as N83-24224
(ESA-TT-813; ONERA-NT-1982-5) Avail: NTIS HC A03/MF A01

An algorithm for plotting structural meshes which result from a two or three dimensional discretization by means of finite elements is presented. The mesh is considered as a geometric representation of a simply connected symmetric graph, and the optimization of the plot is treated as a search for simple chains in the graph. Inclusion of the algorithm in a graphics package reduces mesh plotting time on a mechanical drafter or on a graphics console. When the algorithm is used on a graphics terminal in conversational mode, and when the data transmission rate along the telephone line is slow, the level of interactivity is increased, facilitating the construction of a finite element model.
Author (ESA)

N83-26558# Research Inst. of National Defence, Linkoeping (Sweden).
[ACTIVITIES REPORT FOR THE LABORATORY FOR COMPUTER SCIENCE (FOA 300) AND THE ENGINEERING PSYCHOLOGY AND INFORMATION SYSTEMS (FOA 530)] Annual Report, 1982
Feb. 1983 41 p refs
(FOA-C-30310-E1) Avail: NTIS HC A03/MF A01

Research in image processing, numerical analysis and computer science, and man-computer interaction is summarized. Topics include: computerized image processing; map data information systems; data security; and applications programming and computing support.
Author (ESA)

N83-26559# Boeing Computer Services, Inc., Seattle, Wash.
COMPUTER SCIENCE AND TECHNOLOGY: PLANNING FOR SOFTWARE VALIDATION, VERIFICATION AND TESTING Final Report
Patricia B. Powell, ed. Washington, D.C. NBS Nov. 1982 91 p refs
(Contract NB79-SBCA-0102)
(PB83-144493; NSB-SP-500-98; LC-82-600644) Avail: NTIS HC A05/MF A01 CSCL 09B

The selection and use of validation, verification, and testing (V, V & T) tools and techniques for software development is explained. A primary benefit of practicing V,V&T is increasing confidence in the quality of the software. How to develop a plan to meet specific software V,V&T goals is addressed.
GRA

N83-26560# National Bureau of Standards, Washington, D.C.
THE NBS FIPS SOFTWARE DOCUMENTATION Final Report
A. J. Neumann Oct. 1982 295 p refs Workshop held at Gaithersburg, Md., 3 Mar. 1982
(PB83-140632; NBS-SP-500-94; LC-82-600600) Avail: NTIS HC A13/MF A01 CSCL 09B

Discussants and other participants considered a variety of topics pertaining to software documentation. Topical sessions included: case studies of and reports on application of existing standards; documentation for operation and maintenance, tools for improved documentation; proposal for new documentation standards; enhancing software sharing; improving human interfaces; and quality assurance of documentation. Sixty-three papers were presented in parallel sessions.
GRA

N83-26561# Boeing Engineering and Construction Co., Seattle, Wash.
COMPUTER SCIENCE AND TECHNOLOGY: SOFTWARE VALIDATION, VERIFICATION AND TESTING TECHNIQUE AND TOOL REFERENCE GUIDE Final Report
Washington NBS Sep. 1982 141 p refs
(Contract NB79-SBCA-0102)
(PB83-137455; NBS-SP-500-93; LC-82-600589) Avail: NTIS HC A07/MF A01 CSCL 09B

Thirty techniques and tools for validation, vertification, and testing (V,V&T) are described. Each description includes the basic features of the technique or tool, the input, the output, an example, in assessment of the effectiveness and usability, applicability, and estimate of the learning time and training, and estimate of needed resources, and references.
GRA

N83-26562# Physical Research Lab., Ahmedabad (India).
AUTOMATIC INTEGRATOR. A FORTRAN PROGRAM FOR NUMERICAL INTEGRATION
V. R. Chokshi and K. J. Shah Jun. 1982 18 p
(PB83-135764; PRL/TN-82-03) Avail: NTIS HC A02/MF A01 CSCL 09B

An adaptive technique based on Simpson's 1/3 modified rule for integrating a function defined analytically in an interval or tabulated at given points of an interval is described. A general subroutine, named automatic integrator based on the above method was developed in FORTRAN IV and tested on an IBM 360/44 system. The program can be used to integrate functions defined for both finite and infinite limits. A complete documentation of the program and instructions for execution are provided. Some sample results of various test functions are given for illustration. Subroutine is stored in compiled form in the library.
GRA

62 COMPUTER SYSTEMS

Includes computer networks.

N83-26563# Naval Postgraduate School, Monterey, Calif.
AN EXTENDED MICROCOMPUTER-BASED NETWORK OPTIMIZATION PACKAGE M.S. Thesis
Michael Edward Finley Oct. 1982 89 p refs
(AD-A124659) Avail: NTIS HC A05/MF A01 CSCL 12/1

The capacitated generalized transshipment problem is the most general and universally applicable member of the class of network optimization models. This model subsumes, as specializations, the capacitated and uncapacitated transportation problem as well as the pure network specializations of these models, which include the personnel assignment problem, the maximum flow, and shortest path formulations. The generalized network problem, in turn, can be viewed as a specialization of a linear programming problem having at most two non-zero entries in each column of the constraint matrix. A detailed description is given of the implementation of an efficient algorithm and its supporting data structures, used to solve large-scale, minimum-cost generalized transshipment problems on an Apple II (64K) microcomputer. A suite of advanced techniques for managing minimum-cost network flow models and inherent data elements will also be discussed.
Author (GRA)

N83-26564# Illinois Univ., Urbana. Coordinated Science Lab.
A LOCAL COMPUTER NETWORK IMPLEMENTATION USING ETHERNET M.S. Thesis
David John Lilja Aug. 1982 115 p refs
(Contract N00039-80-C-0556)
(AD-A124448; R-946; UILU-ENG-82-2212) Avail: NTIS HC A06/MF A01 CSCL 09/2

An Ethernet is used to connect an HP 3000 computer with a VAX 11/780 computer to allow the transfer of files from one computer to the other. A user logs in on the VAX computers and uses a one-line command to send a file or to retrieve a file from the HP 3000 computer. Files are transferred between the user's directory on the VAX and either a specified directory or a public network directory on the HP 3000. The file transfer system uses a scheme of positive acknowledgement with retransmission to prevent transmission errors from corrupting the file. Author (GRA)

N83-26565# SRI International Corp., Menlo Park, Calif.
NAME ASSIGNMENT IN COMPUTER NETWORKS
Raphael Rom Oct. 1982 34 p refs
(Contract MDA903-80-C-0222; ARPA Order-2303)

(TR-1080-310-1) Avail: NTIS HC A03/MF A01 CSCL 12/1

Name assignment, the procedure by which an identifier is assigned to the nodes of a network to be used subsequently by other networking mechanisms, is investigated in detail in this report for such situations as node restart and relocation, network merger and startup. Algorithms for a four-phase approach to network relocation are proposed. In the first phase, pairs of neighboring nodes get acquainted; in second phase, the pair must decide whether their networks are indeed distinct and should merger; in third phase, each of the two nodes alerts the other nodes in its subnetwork of the prospective merger and proceeds to phase four, the merger itself. GRA

N83-26566# Florida Univ., Gainesville. Data Base Systems Research and Development Center.

PARALLEL ALGORITHMS AND THEIR IMPLEMENTATION IN MICRONET

S. Y. W. Su and K. P. Mikkilieni 1982 15 p refs Presented at Very Large Data Base Conf., Mexico City, 8 Sep. 1982

(Contract DE-AS05-81ER-10977)

(DE83-006511; CONF-820984-3) Avail: NTIS HC A02/MF A01

A simple microcomputer network system and its architectural support for four categories of database operations are described. The design and implementation of hardware and software and the parallel algorithms for the database operations are described and illustrated. Three new algorithms, one for finding maximum/minimum, and two for sorting distributed files, are presented together with their implementations in MICRONET. The results of the analyses of the new sorting algorithms and a comparison with other sorting algorithms are also given. The system is characterized by its simplicity in network connection and communication, flexibility in expanding or contracting the size of the network; reliability achieved by interchangeable hardware and software; and high performance achieved by one-to-all broadcasting, hardware scheduling, and special control lines for inter-processor communication and synchronization. DOE

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N83-26567*# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.

APPLICATION OF KALMAN FILTERS TO ROBOT CALIBRATION Final Technical Report

Daniel E. Whitney and Eric F. Junkel Jan. 1983 147 p refs

(Contract NAS5-26698)

(NASA-CR-170513; NAS 1.26:170513; CSDL-R-1572) Avail: NTIS HC A07/MF A01 CSCL 09B

This report explores new uses of Kalman filter theory in manufacturing systems (robots in particular). The Kalman filter allows the robot to read its sensors plus external sensors and learn from its experience. In effect, the robot is given primitive intelligence. The study, which is applicable to any type of powered kinematic linkage, focuses on the calibration of a manipulator. Author

N83-26568# Illinois Univ., Urbana. Decision and Control Lab.

ROBUSTNESS OF MODEL REFERENCE ADAPTIVE SCHEMES WITH RESPECT TO MODELING ERRORS Ph.D. Thesis

Petros Andreou Ioannou Oct. 1982 151 p refs

(Contract N00014-79-C-0424; AF-AFOSR-3633-78)

(AD-A124449; DC-53; UILU-ENG-82-2221) Avail: NTIS HC A08/MF A01 CSCL 12/1

The robustness of model reference adaptive schemes with respect to unmodeled parasitics is analyzed. Bounds on parameter and state errors are established for identifiers and adaptive observers. In the case of adaptive control, algorithms are modified to guarantee boundedness. Decentralized adaptive control schemes guaranteeing the stability of a class of large-scale systems are proposed. This thesis is divided into six sections. Different characterizations are given for the model-plant mismatch in Sections 2 to 5 and 6. The characterization in Sections 2 to 5 assumes a separation of time scales between the modeled and unmodeled phenomena. The order of the model is equal to the order of the slow part of the unknown plant and the model-plant mismatch is due to the fast part of the plant. In most applications the slow part consists of dominant modes, while the neglected fast modes are considered as parasitics. The approach is asymptotic. In Section 6 the model-plant mismatch is characterized by neglected interconnections between different subsystems. Adaptive schemes are first designed for the decoupled subsystems and then applied to the overall system with the interconnections. GRA

N83-26569# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.

SEMANTICS OF INHERITANCE AND ATTRIBUTIONS IN THE DESCRIPTION SYSTEM OMEGA. REVISION

Giuseppe Attardi and Maria Simi Jan. 1982 39 p refs Sponsored in part by Olivetti

(Contracts N00014-80-C-0505; N00014-75-C-0522)

(AD-A123925; AI-M-642-Rev) Avail: NTIS HC A03/MF A01 CSCL 05/7

Omega is a description system for knowledge embedding which incorporates some of the attractive modes of expression in common sense reasoning such as descriptions, inheritance, quantification, negation, attributions and multiple viewpoints. A formalization of Omega is developed as a framework for investigations on the foundations of knowledge representation. As a logic, Omega achieves the goal of an intuitively sound and consistent theory of classes which permits unrestricted abstraction within a powerful logic system. Description abstraction is the construct provided in Omega corresponding to set abstraction. Attributions and inheritance are the basic mechanisms for knowledge structuring. To achieve flexibility and incrementality. the language allows descriptions with an arbitrary number of attributions, rather then predicates with a fixed number of arguments as in predicate logic. This requires a peculiar interpretation for instance descriptions, which in turn provides insights into the use and meaning of several kind of attributions. The formal treatment consists in presenting semantic models for Omega, deriving an axiomazation and establishing the consistency and completeness of the logic. Author (GRA)

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N83-26570 British Aerospace Dynamics Group, Stevenage (England). Dynamics Group.

THE USE OF NUMBER THEORETIC TRANSFORMS IN THE CORRELATION OF MATRICES WITH NON-NEGATIVE ELEMENTS

G. Fraser-Andrews Dec. 1981 17 p ref

(BAe-ST-25923) Avail: Issuing Activity

The feasibility of using number theoretic transforms (NThT) for matrix correlation is investigated and is compared with the use of fast Fourier transforms. The NThT differ from Fourier transform in using integer data and integer arithmetic, module m, where m is an integer to be specified. The NThT is described for Fermat numbers. It is shown that correlations can be carried out using NThT with the advantages of exactness and speed (three to five times faster than fast Fourier transforms). Disadvantages include the number of bits needed and that the arithmetic unit has to be wired up to perform arithmetic with a finite modulus. An NThT program written in FORTRAN is presented. Author (ESA)

N83-26571# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

DIGITAL IMAGE INTERPOLATION METHODS BY MEANS OF

FINITE IMPULSE RESPONSE FILLERS M.S. Thesis - 5 Nov. 1982 [METHODOS DE INTERPOLACAO EM IMAGENS DIGITAIS POR MEIO DE TECNICAS DE PROJETO DE FILTROS F. I. R.]
Gilberto Camera Neto Mar. 1983 122 p refs In PORTUGUESE; ENGLISH summary
(INPE-2663-TDL/120) Avail: NTIS HC A06/MF A01

Interpolation by convolution with finite impulse response filters is dealt with. Interpolation design by various techniques including the windowing method, and the equiripple method are used. Heuristic algorithms which take in account the edge information in images to design more efficient interpolators are presented. Author

N83-26572# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
HOUGH FUNCTIONS: THEORY AND USE [FUNCOES DE HOUGH: TEORIA E UTILIZACAO]
Jose Paulo Bonatti, Pedro Leite Silva Dias, and Antonio Divino Moura Apr. 1983 272 p refs In PORTUGUESE; ENGLISH summary
(INPE-2697-RPE/429) Avail: NTIS HC A12/MF A01

The horizontal structure of the linearized homogeneous primitive equations on the sphere (Laplace's tidal equations), is obtained by a spherical harmonic expansion which yields the Hough functions. The finite difference form of the vertical structure of these equations is analyzed using sigma-coordinates. The application of Hough functions and vertical structure functions as a basis for expansion of three-dimensional observed data is discussed. The structure of the horizontal and vertical modes and the energetics associated with Hough functions are studied. Wind and geopotential fields and corresponding divergence and vorticity are displayed for various Hough modes. The frequency diagram and the energy dispersion of Hough function as a wave reinforcement process are studied. The forced case, in which the equivalent depth is obtained from the known values of the frequency and the wave number, is also discussed. A complete description of the numerical procedures is also given. Author

N83-26573# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
DATA SELECTION FOR PROGRAM TESTING M.S. Thesis [SELECAO DE DADOS PARA TESTES DE PROGRAMAS]
Rose Mary Salazar Anaya Zavaleta Mar. 1983 131 p refs In PORTUGUESE; ENGLISH summary
(INPE-2673-TDL/122) Avail: NTIS HC A07/MF A01

A system which intends to provide some help to the user in the process of selecting data for testing FORTRAN programs is presented. Aspects related to the static and dynamic analysis of programs which allow the identification of the statements and transferences of control not executed in a given test are discussed. Several examples are given to illustrate in detail the use of the system. Author

N83-26574# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
NUMERICAL STABILITY OF A LIMITED AREA DISCRETE DIVERGENT BAROTROPIC MODEL [ESTABILIDADE NUMERICA DE UM MODELO BAROTROPICO DIVERGENTE DISCRETO DE AREA LIMITADA]
Jose Paulo Bonatti and Pedro Leite Silva Dias Apr. 1983 71 p refs In PORTUGUESE; ENGLISH summary
(INPE-2703-RPE/430) Avail: NTIS HC A04/MF A01

The numerical stability of a finite difference barotropic, limited area, divergent model is analyzed using the normal modes technique. The space differencing is based on Shuman's semi-momentum scheme and the time integration is performed with a Euler-backward step. The methodology to derive the associated eigenfunction-eigenvalue problem is described in detail. The frequency diagram and the stability criteria are discussed as well as the differences between the meridional structure of the discrete modes and the corresponding continuous modes on the sphere. The limited area model allows unconditionally unstable modes in the Rossby regime but with large e-folding time; computational modes are also found and the dispersion of energy by gravity waves is highly distorted. The method chosen to analyze the stability allows for the inclusion of the boundary conditions. Such analysis provides the normal modes, which can be used as basis functions for the observed data and filtering of unwanted modes (normal mode initialization). Author

N83-26575# Colorado Univ., Boulder. Dept. of Computer Science.
A MODULAR SYSTEM OF ALGORITHMS FOR UNCONSTRAINED MINIMIZATION
Robert B. Schnabel, John E. Koontz, and Barry E. Weiss Nov. 1982 37 p refs
(Contracts DAAG29-81-K-0108; DAAG29-79-C-0023)
(AD-A123204; CU-CS-240-82; ARO-18197.2-MA) Avail: NTIS HC A03/MF A01 CSCL 12/1

We describe a new package, UNCMIN, for finding a local minimizer of a real valued function of more than one variable. The novel feature of UNCMIN is that it is a modular system of algorithms, containing three different step selection strategies (line search, dogleg, and optimal step) that may be combined with either analytic or finite difference gradient evaluation, and either analytic, finite difference, or BFGS Hessian approximation. We present the results of a comparison of the three step selection strategies on the problems in More, Garbow, and Hillstrom in two separate cases: using finite difference gradients and Hessians, and using finite difference gradients with BFGS Hessian approximations. We also describe a second package, REVMIN, that uses optimization algorithms identical to UNCMIN but obtains values of user supplied functions by reverse communication. Author (GRA)

N83-26576# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ROBUST MULTIPLE LINEAR REGRESSION M.S. Thesis
Ahmed Mohamed M. Sultan Dec. 1982 73 p refs
(AD-A124678; AFIT/GOR/MA/82D-3) Avail: NTIS HC A04/MF A01 CSCL 12/1

An extensive Monte Carlo analysis is conducted to determine the performance of robust linear regression techniques with and without outliers. Thirteen methods of regression are compared including least squares and minimum absolute deviation. The classical robust techniques of Huber, Hampel were studied and robust techniques using the Q-statistic as a discriminant were introduced. The model studied contained eleven variables with 27 observations. The error distributions considered were uniformly normally, double exponentially distributed. Least squares gave the best fit without outliers. In the presence of gross outliers a rejection of outliers technique gave the best fit. Author (GRA)

N83-26577# California Univ., Los Angeles. School of Engineering and Applied Science.
NONLINEAR FILTERING, THE LINK BETWEEN KALMAN AND EXTENDED KALMAN FILTERS Final Report, 29 Nov. 1979 - 28 Nov. 1981
Hosam E. Emara-Shabaik Mar. 1982 30 p refs
(Contract DASG60-80-C-0007)
(AD-A124642) Avail: NTIS HC A03/MF A01 CSCL 12/1

The problem of developing practical suboptimal filters for nonlinear systems is treated using a different approach. The developed filter (E1-F) is found to fill in the gap between the Kalman and the Extended Kalman filters. A numerical experiment to test the performance of the developed filter is conducted and the results are shown. Author (GRA)

N83-26578# California Univ., Los Angeles. School of Engineering and Applied Science.
CLOSED LOOP FORMULATIONS OF OPTIMAL CONTROL PROBLEMS FOR MINIMUM SENSITIVITY Final Report, 29 Nov. 1979 - 28 Nov. 1981
R. N. Crane Mar. 1982 94 p refs
(Contract DASG60-80-C-0007)
(AD-A124644) Avail: NTIS HC A05/MF A01 CSCL 12/1

A new formulation of the trajectory sensitivity problem is

developed to reduce the effects of modeling errors in optimal control systems. Necessary conditions for minimum sensitivity are obtained from a measurable quasiconvex family of direction fields. These techniques are applicable to a large class of non-linear systems that could not be handled previously by standard sensitivity methods. The principal result is a complete theory for the practical design of minimum sensitive linear feedback compensators. Sufficient conditions are developed from new theorems relating conjugate points to the positive definiteness and controllability of the accessory minimum problem. The advantages of the minimum sensitive compensator relative to least square parameter estimators are discussed. An example illustrates the improved sensitivity characteristics of the compensator as compared to model following and regulating controls. Author (GRA)

N83-26579# California Univ., Los Angeles. School of Engineering and Applied Science.
A NOTE ON THE EXTENDED KALMAN FILTER Final Report, 29 Nov. 1979 - 28 Nov. 1981
Hosam E. Emara-Shabaik Mar. 1982 11 p ref
(Contract DASG60-80-C-0007)
(AD-A124650) Avail: NTIS HC A02/MF A01 CSCL 12/1

The extended Kalman Filter (EKF), in the continuous time version, has to be interpreted in the Ito sense. Therefore, processing of the (EKF) algorithm is much more involved then has appeared to be the case. Additional differential equations have to be processed when the EKF is properly interpreted. GRA

N83-26580# Naval Postgraduate School, Monterey, Calif.
AN OPTIMIZATION APPROACH TO STUDY THE DISTRIBUTION OF THE COEFFICIENT OF DETERMINATION, R2 M.S. Thesis
Jeffery Donald Vick Oct. 1982 51 p refs
(AD-A124586) Avail: NTIS HC A04/MF A01 CSCL 12/1

The empirical model builder utilizing regression techniques frequently relies on the coefficient of determination, R sub 2, to measure goodness of fit. Costing and pricing analysts using such variable selection techniques frequently encounter inflated R sub 2 values. This paper examines the space within which the regression model operates and presents practical optimization algorithms to help assess the amount of confidence that can be placed in R sub 2 for a particular set of candidate predictor variables. The algorithms describe a technique using linear programming to find the lowest value of R sub 2 possible using the given set of data. Author (GRA)

N83-26581# Illinois Univ., Chicago. Dept. of Quantitative Methods.
MULTI-SAMPLE CLUSTER ANALYSIS USING AKAIKE'S INFORMATION CRITERION
Hamparsum Bozdogan and Stanley L. Scolve 20 Dec. 1982 32 p refs Presented at a Spec. Session on Cluster Anal., 789th Meeting, Am. Math. Soc., Amherst, Mass., 16-18 Oct. 1981 Submitted for publication
(Contract DAAG29-82-K-0155)
(AD-A124432; TR-A82-2; ARO-19085.3-MA) Avail: NTIS HC A03/MF A01 CSCL 12/1

Multi-sample cluster analysis, the problem of grouping samples, is studied from an information-theoretic viewpoint via Akaike's Information Criterion (AIC). This criterion combines the maximum value of the likelihood with the number of parameters used in achieving that value. The multi-sample cluster problem is defined, and AIC is developed for this problem. The form of AIC is derived in both the multivariate analysis of variance (MANOVA) model and in the multivariate model with varying mean vectors and variance-covariance matrices. Numerical examples are presented for AIC and another criterion called w-square. The results demonstrate the utility of AIC in identifying the best clustering alternatives. Author (GRA)

N83-26582# Illinois Univ., Urbana. Decision and Control Lab.
NONEXPLICIT SINGULAR PERTURBATIONS AND INTERCONNECTED SYSTEMS
George Michael Peponides Sep. 1982 107 p refs
(Contract N00014-79-C-0424; Grant NSF ECS-79-19396)
(AD-A124423; DC-55; UILU-ENG-82-2226) Avail: NTIS HC A06/MF A01 CSCL 12/1

Singular perturbations have been shown to be an effective tool in the analysis and design of systems with slow and fast dynamics. However, the use of this tool is often inhibited by the fact that when physical quantities are selected as state variables, the model fails to be in the standard singularly perturbed form. In this thesis we deal with such nonexplicit models and show that for a wide class of problems a proper selection of variables leads to explicit singularly perturbed models. Equilibrium and conservation properties are shown to provide a coordinate-free characterization of two-time-scale systems. They also suggest a coordinate transformation that transforms nonexplicit models into explicit ones. This transformation is then used to study nonlinear high gain feedback systems, thus extending earlier linear results. It is also utilized to establish the relation between weak connections and time scales in interconnected systems whose subsystems possess a continuum of equilibrium points. Finally, the methodology is applied to reduced order modeling of dynamic networks and it is shown that linear conservation laws lead to a linear transformation separating the time scales even when some of the components of the network are nonlinear. GRA

N83-26583# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A MONTE CARLO TECHNIQUE SUITABLE FOR OBTAINING COMPLEX SPACE SYSTEM RELIABILITY CONFIDENCE LIMITS FROM COMPONENT TEST DATA WITH THREE UNKNOWN PARAMETERS M.S. Thesis
Murray Ross MacDonald Dec. 1982 91 p refs
(AD-A124753; AFIT/GSO/MA/82D-1) Avail: NTIS HC A05/MF A01 CSCL 12/1

A Double Monte Carlo method of obtaining confidence limits for complex systems based on component failure data assuming a three parameter Weibull distribution was developed. Three new parameter estimation routines were developed and compared with the Harter-Moore three parameter maximum likelihood routine for use with the Monte Carlo method. The sensitivity of the method to system reliability, sample size, and number of points in the component reliability distributions was assessed. An approximate method of calculating and correcting for parameter estimation bias was developed and illustrated. The Double Monte Carlo method appears to be effective at system reliabilities from 74% to 96% with component failure sample sizes as well as five with the Linear Least Squares parameter estimation routine developed. Author (GRA)

N83-26584# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
A MULTIVARIATE IFR CLASS
Thomas H. Savits Jan. 1983 18 p refs
(Contract N00014-76-C-0839)
(AD-A124419; TR-83-02) Avail: NTIS HC A02/MF A01 CSCL 12/1

Various univariate classes of life distributions have been introduced in the mathematical theory of reliability. Recently there has been much interest in obtaining multivariate versions of these classes. Although there have been many different approaches, this document mentions only two because of their nice closure properties: the multivariate IFRA class of Block and Savits (1980) and the multivariate NBU class of Marshall and Shaked (1982). Both of these classes are closed under deletion, conjunction, convolution and weak limits. This paper introduces a multivariate IFR class that has similiar closure properties. Its spirit also closely parallels that found in the two previously mentioned papers. Other definitions of a multivariate IFR class have been proposed by Marshall (1975), but none possess all desirable closure properties. Section 2 presents some preliminary facts about log concave functions. Section 3 contains new characterization of the (univariate) IFR class. The multivariate generalization and properties thereof are given in Section 4. A useful alternative condition is delineated in Section 5. Finally, this class is compared with the

multivariate IFRA class of Block and Savits (1980) in Section 6. GRA

N83-26585# Maryland Univ., College Park. Computer Vision Lab.
FILTERED PROJECTIONS AS AN AID IN CORNER DETECTION
Zhong-Quan Wu and Azriel Rosenfeld Jul. 1981 30 p refs
(Contract DAAG53-76-C-0138; DARPA Order 3206)
(AD-A124416; TR-1078) Avail: NTIS HC A03/MF A01 CSCL 12/1

Corners are very useful features for such purposes as image matching or shape analysis, but corner detection is a relatively expensive operation. This paper uses filtered x and y projections, applied to an image containing an object that has not been explicitly, segmented from its background, to determine possible positions of corners, so that corner detection can be applied only in the vicinity of these positions. Even in cases where the object would be hard to segment (unimodal histogram), this approach yields a good set of possible corner positions. GRA

N83-26586# Duke Univ., Durham, N. C. Dept. of Electrical Engineering.
COMPUTATIONALLY EFFICIENT ALGORITHMS FOR DETECTION AND ESTIMATION Final Report, 23 Mar. 1980 - 30 Sep. 1982
Loren W. Nolte Jan. 1983 9 p ref
(Contract DAAG29-80-C-0095)
(AD-A124408; ARO-17132.2-EL) Avail: NTIS HC A02/MF A01 CSCL 09/4

The focus of this research has been on adaptive and computationally efficient algorithms for multichannel signal detection problems with unknown second order statistics. The research goals here were to employ formal methods to obtain detection statistics, compute detection performance as summarized by receiver operating characteristics, and compare the results with current ad-hoc techniques. A secondary goal was to compare and contrast processor structures. Three types of test statistics were compared on the basis of performance. These tests were a generalized likelihood ratio derived by a maximum likelihood technique, a Bayes test obtained by employing a conjugate (Inverted Wishart) prior density for the uncertain covariance matrix, and an estimate and plug test that was considered to be an example of current ad-hoc adaptive array processors. The performance calculations were based on both detailed analysis of the distributions of the tests and computer simulation. GRA

N83-26587# Illinois Univ., Urbana. Decision and Control Lab.
MULTIMODEL DESIGN OF LARGE SCALE SYSTEMS WITH MULTIPLE DECISION MAKERS Ph.D. Thesis
Virkram Raj Saksena Aug. 1982 189 p refs
(Contract N00014-79-C-0424; Grants AF-AFOSR-3633-78; NSF ECS-79-19396)
(AD-A124517; DC-54; UILU-ENG-82-2222) Avail: NTIS HC A09/MF A01 CSCL 12/1

The central theme of this thesis is multimodeling. It is concerned with modeling and control strategy interaction in a multimodel context. Realistic situations are studied, which allow the decision makers to use different simplified models of the system. Three different approaches to multimodeling are examined. Firstly, within the framework of multiparameter singular perturbations, we demonstrate the well-posedness of an a-priori selected multimodeling scheme, for a class of Nash and team problems. This establishes, in some sense, the robustness of this multimodeling to a class of solution concepts and information patterns. Secondly, for a class of weakly-coupled Markov chains, we use a perturbational approach to develop an efficient algorithm for computing near-optimal incentive policies, which allows for multimodeling on the part of the decision makers. Finally, for a class of linear-quadratic problems, we use an input-output approach to restructure the problem, and choose appropriate admissible strategies which induce multimodel solutions. Author (GRA)

N83-26588# Naval Postgraduate School, Monterey, Calif. Dept. of Operations Research.
COMPUTATIONAL ADVANCES IN THE SOLUTION OF LARGE-SCALE SET COVERING AND SET PARTITIONING PROBLEMS M.S. Thesis
Dan O. Bausch Oct. 1982 78 p refs
(AD-A123774) Avail: NTIS HC A05/MF A01 CSCL 12/2

The Set Covering Problem (SCP) and the Set Partitioning Problem (SPP) represent an important class of all-binary (0-1) Integer Linear Programs (ILP). A review of the literature reveals extensive application of the APP/SCP model to a wide set of practical problems. The basic model is explained, and then many of the actual applications of this powerful model discovered in the literature review are discussed. The problems derived from these applications are difficult to solve with any method, and are particularly difficult to solve with optimal or exact algorithms. Various solution techniques were investigated within the framework of the classical simplex method with branch and bound enumeration. Several reformulations of the SPP/SCP as Integer Generalized Networks are examined. Extensive computational results are reported for several real world large-scale problems, and a convenient, compact format for data input is proposed as a standard for this problem class. Author (GRA)

N83-26589# Iowa Univ., Iowa City. College of Engineering.
DYNAMIC ANALYSIS OF THREE DIMENSIONAL CONSTRAINED MECHANICAL SYSTEMS USING EULER PARAMETERS Interim Technical Report
In-Soo Chung, Chia-Ou Chang, Edward J. Haug, Roger A. Wehage, and Ronald R. Beck Warren, Mich. Army Tank Automotive Command Nov. 1982 158 p refs
(Contract DAAK30-80-C-0042)
(AD-A124100; U-OF-IOWA-81-11; TACOM-TR-12591) Avail: NTIS HC A08/MF A01 CSCL 12/1

This paper presents a computer-based method for formulation and efficient solution of nonlinear, constrained differential equations of motion for spatial dynamic analysis of mechanical systems. Nonlinear holonomic constraint equations and differential equations of motion are written in terms of a maximal set of Cartesian generalized coordinates, three translational and four rotational coordinates for each rigid body in the system, where the rotational coordinates are the Euler parameters. Euler parameters, in contrast to Euler angles or any other set of three rotational generalized coordinates, have no critical singular cases. The maximal set of generalized coordinates facilitates the general formulation of constraints and forcing functions. A Gaussian elimination algorithm with full pivoting decomposes the constraint Jacobian matrix, identifies dependent variables, and constructs an influence coefficient matrix relating variations in dependent and independent variables. This information is employed to numerically construct a reduced system of differential equations of motion whose solution yields the total system dynamic response. A numerical integration algorithms with positive-error control, employing a predictor-corrector algorithm with variable order and step size, integrates for only the independent variables, yet effectively determines dependent variables. A three dimensional model of a tracked vehicle has been modeled and the response of the simulations are presented. Author (GRA)

N83-26590# Naval Postgraduate School, Monterey, Calif. Dept. of Operations Research.
COMPUTATIONAL COMPARISON OF VALUE ITERATION ALGORITHMS FOR DISCOUNTED MARKOV DECISION PROCESSES
L. C. Thomas, R. Hartley (Manchester Univ.), and A. C. Lavercombe (Bristol Polytechnic Univ.) Dec. 1982 14 p refs Sponsored in part by the Social Science Research Council
(AD-A123727; NPS55-82-034) Avail: NTIS HC A02/MF A01 CSCL 12/1

This note describes the results of a computational comparison of value iteration algorithms suggested for solving finite state discounted Markov decision processes. Such a process visits a set of states S = (1,2,...M). In Section two we describe the schemes

examined and the various bounds that can be used for stopping them. Section three concentrates on one scheme that did well in the comparison - ordinary value iteration - and looks at various methods for eliminating non-optimal actions both permanently and temporarily. GRA

N83-26591# California Univ., Berkeley. Dept. of Statistics.
ESTIMATING OPTIMAL TRANSFORMATIONS FOR MULTIPLE REGRESSION AND CORRELATION
Leo Breiman and Jerome H. Friedman Jul. 1982 80 p refs
(Contracts N00014-82-K-0054; N00014-81-K-0340)
(AD-A123908; TR-9) Avail: NTIS HC A05/MF A01 CSCL 12/1

Nonlinear transformation of variables is a commonly used practice in regression problems. Two common goals are stabilization of error variance and asymmetrization/normalization of error distribution. A more comprehensive goal, and the one we adopt, is to find those transformations that produce the best fitting additive model. Knowledge of such transformations aid in the interpretation and understanding of the relationship between the response and predictors. GRA

N83-26592# Carnegie-Mellon Univ., Pittsburgh, Pa. Management Sciences Research Group.
A NOTE ON THE WEISZFELD-KUHN ALGORITHM FOR THE GENERAL FERMAT PROBLEM
Egon Balas and Chang-Sung Yu Sep. 1982 10 p refs
(Contract N00014-75-C-0621; Grant NSF ECS-79-02506; NR Proj. 047-048)
(AD-A123914; MSRR-484; WP-12-82-83) Avail: NTIS HC A02/MF A01 CSCL 12/1

The General Fermat Problem, or Weber Problem, asks for a point that minimizes a weighted sum of the distances to m given points. The Weiszfeld-Kuhn algorithm is an iterative procedure that converges to an optimal point for all but a denumerable number of starting points. We give an amended version of the algorithm, that guarantees convergence. Author (GRA)

N83-26593# Louisiana State Univ., Baton Rouge. Dept. of Physics and Astronomy.
NONEXPONENTIAL DECAY IN RELAXATION PHENOMENA AND THE SPECTRAL CHARACTERISTICS OF THE HEAT BATH
A. K. Rajagopal and F. W. Wiegel (Twente Univ. of Technology) 4 Jan. 1981 17 p refs Submitted for publication
(Contract N00014-82-K-0477)
(AD-A124120) Avail: NTIS HC A02/MF A01 CSCL 12/1

After a brief survey of the characteristics of a heat bath and its role in relaxation phenomena leading to the familiar exponential decay, it is argued that the nonexponential form found commonly in many condensed matter systems indicates that the energy spectrum of the heat bath plays a crucial part in these phenomena. In equilibrium statistical mechanics, the mean energy of a heat bath determines the temperature of a system placed in contact with it. We show that the relaxation of a system placed in contact with this heath bath is determined by the distribution of the energy level spacings for level spacings small as compared to the mean spacing. After presenting arguments in favor of a linear behavior of this distribution, we show, in a somewhat heuristic way, that the resulting relaxation function has a nonexponential form. Author (GRA)

N83-26594# National Range Operations Directorate, White Sands Missile Range, N. Mex. Mathematical Services Branch.
ADAPTIVE FIXED INTERVAL TRAJECTORY SMOOTHING
William S. Agee and Robert H. Turner Jan. 1983 19 p refs
(AD-A124107; TR-85) Avail: NTIS HC A02/MF A01 CSCL 12/1

An adaptive, fixed interval smoother for trajectory estimation is described. The fixed interval smoother uses the modified Bryson-Fraser formulation which combines the state estimates of a forward running Kalman filter and a backward running adjoint filter. The square root formulation used for the Kalman filter is described. The procedures used to adapt the Kalman filter to the local noise content of the measurements and to adapt the filter to abrupt changes in target acceleration are discussed. Author (GRA)

N83-26595# Naval Postgraduate School, Monterey, Calif.
CALCULATION OF HYDROGRAPHIC POSITION DATA BY LEAST SQUARES ADJUSTMENT M.S. Thesis
Francisco Castro e Silva Jun. 1982 191 p refs
(AD-A123917) Avail: NTIS HC A09/MF A01 CSCL 12/1

When redundant observations are available, hydrographic positioning problems require the application of a data adjustment method so that all information may be used for obtaining the most reliable fix. One of the oldest and best engineering techniques developed for the purpose is based on the least squares principle. The theoretical background is provided to explain that principle and the technique for its application. Also, the analytical solutions, and respective computer programs implementing them, are developed for the following hydrographic positioning methods: (a) fix by N azimuths; (b) fix by N sextant angles; and (c) fix by two range distances and one azimuth. For each method, an illustrative application of the respective computer program is presented. The least square adjustment method not only yields the most likely values for the fix coordinates but also statistically quantifies position accuracy. Relative accuracy achieved with conventional survey methods is elevated to absolute accuracy when redundant observations are made and adjusted using the method of least squares. Author (GRA)

N83-26596# SRI International Corp., Menlo Park, Calif. Artificial Intelligence Center.
RESEARCH ON PARALLELISM IN PROBLEM-SOLVING SYSTEMS Annual Technical Report, 1 Sep. 1981 - 31 Aug. 1982
David E. Wilkins 3 Sep. 1982 12 p refs
(Contract F49620-79-C-0188; AF Proj. 2304)
(AD-A125192; AFOSR-83-0035TR; ATR-3) Avail: NTIS HC A02/MF A01 CSCL 12/1

This report summarizes SRI International's third year of research on a system for automatically generating hierarchical plans containing parallel (concurrent) actions. This is a general planning and problem-solving system that is not tied to a particular domain. Results of this research might eventually be used in the development of systems for automatically generating plans to coordinate the activities of military personnel engaged in a common mission. Other domains of applications could include logistical planning, planning the concurrent use of many computers on a single network, and planning the movements of a robot arm. GRA

N83-26597# Rice Univ., Houston, Tex. School of Engineering.
REDUCING ALIASING IN THE WIGNER DISTRIBUTION USING IMPLICIT SPLINE INTERPOLATION
G. F. Boudreaux-Bartels and T. W. Parks Dec. 1982 21 p refs
(Contract N00014-81-K-0565; Grant NSF ENG-78-09033)
(AD-A124850; TR-8219) Avail: NTIS HC A02/MF A01 CSCL 12/1

The Wigner Distribution (WD) is a bilinear signal transformation possessing several properties that are useful in time-frequency signal analysis. Fast Fourier transforms (FFT) techniques have been used to approximate the WD. However, the signal must be sampled at twice the Nyquist rate in order to avoid aliasing errors. This paper demonstrates that implicit spline interpolation of a continuous time signal or an undersampled time sequence can be used to reduce aliasing errors when approximating the WD. The method is said to be implicit since the interpolated samples are never actually computed. An efficient implicit interpolation algorithm that takes advantage of the special structure and symmetry of the WD is proposed. Author (GRA)

N83-26598# Southeastern Center for Electrical Engineering Education, Inc., St. Cloud, Fla.
THE ROLE OF FAR-FIELD BOUNDARY CONDITIONS IN NUMERICAL SOLUTIONS OF THE NAVIER-STOKES EQUATIONS Final Report, May - Sep. 1981
Patrick Joseph McKenna (Florida Univ.), Jeff E. Graham, and Wilbur

L. Hankey Wright-Patterson AFB, Ohio AFWAL Sep. 1982 39 p refs
(Contract F49620-79-C-0038; AF Proj. 2307)
(AD-A125004; AFWAL-TR-82-3029) Avail: NTIS HC A03/MF A01 CSCL 12/1

The problem of prescribing farfield boundary conditions on the outer computational domain boundary is discussed. Several boundary conditions which have been used in the literature are compared with two newly proposed sets. The proposed boundary conditions are shown to be non-reflecting and superior in both accuracy and time to convergence. Graphs showing the numerical results for the different types of boundary conditions are displayed and the wave motion demonstrated. Author (GRA)

N83-26599# American Coll. Testing Program, Iowa city, Iowa.
THE USE OF THE GENERAL RASCH MODEL WITH MULTIDIMENSIONAL ITEM RESPONSE DATA
Robert I. McKinley and Mark D. Reckase Aug. 1982 37 p refs
(Contract N00014-81-K-0817; RR0420401)
(AD-A125099; RR-82-1-ONR) Avail: NTIS HC A03/MF A01 CSCL 12/1

Several special cases of the general Rasch model, varying in complexity, were investigated to determine whether they could successfully model realistic multidimensional item response data. Also investigated was whether the parameters of the model could be readily interpreted. Of the formulations of the model investigated, all but two were found to be incapable of modeling realistic multidimensional item response data. One of the remaining formulations of the model was found to have limited applications. The version of the model found to be most useful is an extension of the two-parameter logistic model. Author (GRA)

N83-26600# South Carolina Univ., Columbia. Dept of Mathematics and Statistics.
SYSTEMS OF NONLINEAR HYPERBOLIC EQUATIONS ASSOCIATED WITH PROBLEMS OF CLASSICAL ELECTROMAGNETIC THEORY
Frederick Bloom 17 Dec. 1982 34 p refs
(Grant AF-AFOSR-0171-81; AF Proj. 2304)
(AD-A125133; AFOSR-83-0019TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

A survey is given of nonlinear phenomena in classical electromagnetic theory with the emphasis on singularity development in nonlinear materials and electromagnetic shock wave formation in nonlinear distributed parameter transmission lines. As influences on shock wave formation the author considers the mechanisms of anisotropy, nonlinear conduction, dispersion and relaxation. Author (GRA)

N83-26601# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
LIKLIHOOD RATIO TESTS FOR RELATIONSHIPS BETWEEN TWO COVARIANCE MATRICES
C. Radhakrishna Rao Nov. 1982 20 p refs
(Contract F49620-82-K-0001; AF Proj. 2304)
(AD-A125162; TR-82-36; AFOSR-83-0005TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Likelihood ratio tests for hypotheses on relationships between two population covariance matrices Sigma 1 and Sigma 2 are derived on the basis of the sample covariance matrices having Wishart distributions. The specific hypotheses considered are (1) Sigma 2 = sigma 2 Sigma 1, (2) Sigma 2 = gamma + sigma 2 Sigma 1, (3) Sigma 2 = gamma + Sigma 1 where gamma may be n.n.d. or arbitrary and the rank of gamma is less than that of Sigma 1. Some applications of these tests are given. GRA

N83-26602# Texas A&M Univ., College Station. Inst. of Statistics.
ENTROPY INTERPRETATION OF GOODNESS OF FIT TESTS
Emanuel Parzen Jan. 1983 13 p refs
(Contract DAAG29-80-C-0070)
(AD-A125155; TR-B-8; ARO-16992.14-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper describes a synthesis of statistical reasoning called FUN.STAT (because it is fun; functional (useful); based on functional analysis; estimates functions; and all graphs are of functions). FUN.STAT has three important components: quantile and density-quantile signatures of populations, entropy and information measures, and functional statistical inference. A FUN.STAT approach to the problem of identifying the probability distribution F(x) of a random variable X from a random sample is outlined. Author (GRA)

N83-26603# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
ROBUSTNESS PROPERTIES OF THE F-TEST AND BEST LINEAR UNBIASED ESTIMATORS IN LINEAR MODELS
Bimal Kumar Sinha and Hilmar Drygas Nov. 1982 16 p refs
(Contract F49620-82-K-0001; AF Proj. 2304)
(AD-A125044; TR-82-28; AFOSR-83-0018TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Document considers a linear model Y = X beta + sigma epsilon, E(epsilon) = O, E(epsilon prime) = I sub n with beta, sigma unknown. For the problem of testing the linear hypothesis C beta = sigma im(C prime) a subset of im(X prime), Ghosh and Sinha (1980) proved that the properties of the usual F-test being LRT and UMPI (under a suitable group a transformations) remain valid for specific non-normal families. In this paper it is shown that both criterion and inference robustness of the F-test hold under the assumption epsilon about q(epsilon prime), q convex and isotonic. This result is similar to a robustness property of Hotelling's T squared-test proved by Kariya (1981). Finally it is proved that the Best Linear Unbiased Estimator (BLUE) of any estimable function beta is more concentrated around C beta than any other unbiased estimator of C beta under the assumption that epsilon is spherically distributed. GRA

N83-26604# California Univ., Santa Barbara. Inst. for the Interdisciplinary Applications of Algebra and Combinatorics.
EIGENVALUES, NUMERICAL RANGES, STABILITY ANALYSIS AND APPLICATIONS OF NUMBER THEORY TO COMPUTING Annual Scientific Report, 30 Sep. 1981 - 29 Sep. 1982
M. Marcus, R. C. Thompson, M. Newman, M. Goldberg, and H. Minc Sep. 1982 42 p refs
(Grant AF-AFOSR-0127-79; AF Proj. 9749)
(AD-A125074; AFOSR-83-0012TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

Work in the period under review centered principally on the topics: (1) numerical methods for systems of linear equations, (2) the numerical range, including computer routines for its evaluation, (3) inequalities involving matrices, (4) properties of eigenvalues, singular values, and invariant factors, (5) properties of norms and condition numbers on matrices. GRA

N83-26605# Naval Ship Research and Development Center, Bethesda, Md.
COMPUTER IMPLEMENTATION OF COUPLED BOUNDARY INTEGRAL EQUATION AND FINITE ELEMENT METHODS
Erwin A. Schroeder Feb. 1983 36 p refs
(SR0140301)
(AD-A125071; DTNSRDC-83/002) Avail: NTIS HC A03/MF A01 CSCL 12/1

This report describes a method for computing solutions to partial differential equations in unbounded regions. The differential equations and unbounded regions arise in problems such as underwater acoustic and magnetic or electric fields surrounding vehicles or instruments in the sea or air. The method couples finite element and boundary integral equation solutions to compute shock response of submarine hulls, acoustic scattering due to elastic structures, electromagnetic signatures of ships and submarines, etc. The finite element method is used in the bounded region occupied by the vehicle or instrument. In this region there may be acoustic, magnetic or electric sources and the material properties may be nonuniform. The boundary integral equation method is used in the unbounded region occupied by the surrounding sea

or atmosphere. This method requires that the unbounded region be assumed to be free of sources and have uniform material properties. The coupled method produced good results for a sample problem in which the temperature distribution was computed for a two-dimensional steady state heat flow. Author (GRA)

N83-26606# California Univ., Livermore. Lawrence Livermore Lab.
ANALYSIS OF A MULTIGRID METHOD AS AN ITERATIVE TECHNIQUE FOR SOLVING LINEAR SYSTEMS
Anne Greenbaum 18 Jun. 1982 27 p refs Presented at the 1982 DOE NASIG Meeting, Los Alamos, N. Mex., 23-25 Jun. 1982
(Contract W-7405-eng-48)
(DE82-018068; UCRL-87912; CONF-8206102-1) Avail: NTIS HC A03/MF A01

A general class of iterative methods is introduced for solving symmetric, positive definite linear systems. These methods use two different approximations to the inverse of the matrix of the problem, one of which involves the inverse of a smaller matrix. It is shown that the methods of this class reduce the error by a constant factor at each step and that under ideal circumstances that constant is equal to kappa prime-1/kappaprime+1 where kappa prime is the ratio of the largest eigenvalue to the (J+1)/sup st/ eigenvalue of the matrix, J being the dimension of the smaller matrix involved. A multigrid method is presented as an example of a method of this class, and it is shown that while the multigrid method does not quite achieve this optimal rate of convergence, it does reduce the error at each step by a constant factor independent of the mesh spacing h. DOE

N83-26607# New York Univ., New York. Courant Mathematics and Computing Lab.
VARIATIONAL METHOD FOR GENERATING MULTIDIMENSIONAL ADAPTIVE GRIDS Ph.D. Thesis
Jeffrey Saltzman Feb. 1982 174 p
(Contract DE-AC02-76ER-03077)
(DE82-015474; DOE/ER-03077/174) Avail: NTIS HC A08/MF A01

This paper discusses adaptive meshes that are generated by the use of variational principles. These adaptive meshes are used in conjunction with finite difference methods to continuously rezone calculations. The fixed number of mesh vertices are moved in a manner which enhances the numerical accuracy of these finite difference schemes when solving singular problems. DOE

N83-26608# Argonne National Lab., Ill. Mathematics and Computer Science Div.
RANDOMLY GENERATED TEST PROBLEMS FOR POSITIVE DEFINITE QUADRATIC PROGRAMMING
Melanie L. Lenard and Michael Minkoff Oct. 1982 17 p refs
(Contract W-31-109-eng-38)
(DE83-004400; ANL-82-73) Avail: NTIS HC A02/MF A01

A procedure is described for randomly generating positive definite quadratic programming test problems. The test problems are constructed in the form of linear least squares problems subject to linear constraints. The probability measure for the problems so generated is invariant under orthogonal transformations. The procedure allows the user to specify the size of the least squares problem (number of unknown parameters, number of observations, and number of constraints); the relative magnitude of the residuals; and the structure of the feasible region (number of equality constraints and the number of inequalities which will be active at the feasible starting point and at the optimal solution). An example is given illustrating how these problems can be used to evaluate the performance of a software package. DOE

N83-26609# Tel-Aviv Univ. (Israel).
ON A CLASS OF HIGH-RESOLUTION TOTAL-VARIATION-STABLE FINITE-DIFFERENCE SCHEMES
Amiram Harten Oct. 1982 54 p refs
(Contract DE-AC02-76ER-03077)
(DE83-004386; DOE/ER-03077/176) Avail: NTIS HC A04/MF A01

This paper presents a class of new explicit and implicit second order accurate finite difference schemes for the computation of weak solutions of hyperbolic conservation laws. These highly nonlinear schemes are obtained by applying a nonoscillatory first order accurate scheme to an appropriately modified flux. The so derived second order accurate schemes achieve high resolution, while retaining the robustness of the original first order accurate scheme. DOE

N83-26610# Oak Ridge National Lab., Tenn.
COMBINED DIRECT-ITERATIVE METHOD FOR CERTAIN M-MATRIX LINEAR SYSTEMS
R. E. Funderlic and R. J. Plemmons (North Carolina State Univ.) Feb. 1983 23 p refs
(Contract W-7405-eng-26; Grant DAAG29-81-K-0132)
(DE83-005982; ORNL/CSD-112) Avail: NTIS HC A02/MF A01

Large, sparse, irreducible singular (column diagonal dominant) M-matrices A occur in various applications including queueing networks, input-output analysis and compartmental analysis. A splitting A = M - N with the matrix M having symmetric zero structure is a regular splitting and these splittings induce a combined direct-iterative solution to Ax = O. A sparce LU factorization of a symmetric permutation of A can be obtained using a standard symmetric ordering scheme such as minimum degree. No pivoting for stability is necessary. Splitting strategies based on a tolerance factor are also discussed and some numerical experience is given. DOE

N83-26611# Pennsylvania State Univ., University Park. Applied Research Lab.
STOCHASTIC CONVERGENCE PROPERTIES OF THE ADAPTIVE GRADIENT LATTICE Interim Report
G. R. Sohie and L. H. Sibul 8 Dec. 1982 32 p refs
(Contract N00024-79-C-6043)
(AD-A125130; ARL/PSU/TM-82-237) Avail: NTIS HC A03/MF A01 CSCL 12/1

A stochastic fixed-point theorem is used as a basis for the study of stochastic convergence properties (in mean squares sense) of the adaptive gradient lattice filter. Such properties include conditions on the stepsize in the adaptive algorithm and analytic expressions for the misadjustment and convergence rate. Results indicate that the limits on the stepsize are stricter than the ones obtained by considering convergence of the mean of the mean-square error can be obtained. It is shown that faster convergence is achieved for highly uncorrelated sequences (low S/n ratio) than for almost deterministic sequences (high S/N ratio). The misadjustment is shown to be exponentially dependent on the number of stages in the lattice and is higher for uncorrelated sequences than for almost deterministic sequences. GRA

N83-26612# Sandia Labs., Albuquerque, N. Mex. Numerical Mathematics Div.
ASYMPTOTIC BOUNDS ON THE ERRORS OF ONE-STEP METHODS
Lawrence F. Shampine Feb. 1983 10 p refs
(Contract DE-AC04-76DP-00789)
(DE83-006924; SAND-83-0056) Avail: NTIS HC A02/MF A01

How to construct bounds using any one-step method endowed with an asymptotically correct local error estimator is shown. The extrapolation codes vary their order from step to step. Correspondingly, changing the one-step method at every step is allowed. The task breaks into three parts. In the next section, how to construct asymptotic bounds on the local error is shown. The following section outlines a global convergence proof which accounts for variation of formula from step to step and for the fact that the construction itself employs one of two formulas at each step. Finally the full construction and its justification are given. In a last section it is emphasized that asymptotic bounds may not be useful for assessing the general size of the global errors. DOE

N83-26613# European Space Agency, Paris (France).
ON THE DETECTION OF MOVING OBJECTS BY SPACE AND TIME INVARIANT FILTERS
Ulrich Boes Mar. 1983 87 p refs Transl. into ENGLISH of "Beitrag zur Detecktion Bewegter Objekte Mittels orts-u. Zeitinvarianter Filter', DFVLR, Oberpfaffenhofen, West Ger. Report DFVLR-FB-81-37, Sep. 1981 Original report in GERMAN previously announced as N82-23408
(ESA-TT-753; DFVLR-FB-81-37) Avail: NTIS HC A05/MF A01; original German version available from DFVLR, Cologne DM 17,60

A linear, three dimensional space and time invariant filter with following threshold by which moving objects can be detected and isolated from occlusion, background, and background noise was designed. The structure consists of a chain of linear space and time filters, analyzed by system theory. The performance was demonstrated in simulations and the detection capability proven to be superior to that of nonlinear filters based on correlation techniques. The filter is shown to be particularly useful in TV tracking devices and for controlling maintenance systems.
Author (ESA)

N83-26614# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
APPROXIMATION WITH CONVOLUTION OPERATORS
P. C. Sikhema 1982 20 p refs
(PB83-147132; Rept-82-30) Avail: NTIS HC A02/MF A01 CSCL 12A

Global results on approximation with convolution operators containing the modulus of continuity of functions involved are summarized. Local results of Voronovskaya-type are recorded including a list of such results for particular operators. The main part of the paper deals with a relation between these two ways of approximation in the sense that under a certain condition, from a Coronovskaya-type formula, a result follows concerning the best global approximation for the whole class of functions involved, and conversely. GRA

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N83-26615# Illinois Univ., Urbana. Coordinated Science Lab.
ASYMPTOTIC EFFICIENCIES OF TRUNCATED SEQUENTIAL TESTS
Sawasd Tantaratana and H. Vincent Poor Feb. 1982 51 p refs (Contract N00014-79-C-0424; Grant NSF ECS-79-16453)
(AD-A124549; R-938; UILU-ENG-82-2204) Avail: NTIS HC A04/MF A01 CSCL 12/1

Truncation of a sequential test with constant boundaries is considered for the problem of testing a location hypothesis, f(x-theta 0) versus f(x-theta 1). A test design procedure is developed by using bounds for the error probabilities under the hypothesis and alternative. By viewing the truncated sequential test as a mixture of a sequential probability ratio test and a fixed sample size test, its boundaries and truncation point can be obtained once the degree of mixture is specified. Asympotically correct approximations for the operating characteristic function and the average sample number function of the resulting test are derived. Numerical results show that an appropriately designed truncated sequential test performs favorably as compared to both the fixed sample size test and the sequential probability ratio test with the same error probabilities. GRA

N83-26616# Decision Systems, Inc., Beavercreek, Ohio.
THE LOGARITHMIC POISSON GAMMA DISTRIBUTION: A MODEL FOR LEADTIME DEMAND Interim Report
Steven Nahmias and W. Steven Demmy Dec. 1981 19 p refs (Contract F33600-80-C-0530)
(AD-A124540; WP-81-04) Avail: NTIS HC A02/MF A01 CSCL 12/1

Many of the inventory models which are used in practice rely upon knowing the probability distribution of demand over a leadtime. The common assumption is that this distribution is normal. However, in certain circumstances, the normality assumption may be inappropriate. We consider a process in which demand occurrences obey a stationary Poisson process and at ech occurrence a random number of units are demanded. Furthermore, the leadtime for replenishment is assumed to be random as well. Assuming a logarithmic compounding distribution and a gamma distribution of leadtime we derive the exact distribution of total demand in a leadtime. We call this the Logarithmic-Poisson-Gamma (LPG) distribution. An approximation is derived which is equivalent to a scaled version of the negative binomial distribution. In the final section we derive the first four central moments. GRA

N83-26617# Colorado State Univ., Fort Collins. Dept. of Statistics.
CONFIDENCE INTERVALS FOR FUNCTIONS OF VARIANCE COMPONENTS Final Report
Franklin A. Graybill 14 Oct. 1982 6 p
(Contract N00014-78-C-0463; NR Proj. 042-402)
(AD-A123844) Avail: NTIS HC A02/MF A01 CSCL 12/1

In this project confidence intervals were determined for the functions of variance components. These included one-sided and two-sided confidence intervals. Since no method is available for exact (exact confidence coefficients) for confidence intervals on the functions of variance components considered, confidence intervals with approximate confidence coefficients were examined. In each case large simulation studies were conducted to determine how good the confidence intervals are. In cases where alternative methods are available, they were compared to the procedures in this project. GRA

N83-26618# Stanford Univ., Calif. Dept. of Operations Research.
AN AUTOREGRESSIVE METHOD FOR SIMULATION OUTPUT ANALYSIS
Yung-Li Lily Jow Dec. 1982 116 p refs
(Contract N00014-76-C-0578; Grant NSF MCS-79-09139; NR Proj. 042-343)
(AD-A123823; SU-TR-65) Avail: NTIS HC A06/MF A01 CSCL 12/1

As the use of computer simulation becomes more important in the study of complex phenomena, the need to develop theoretically sound and computationally efficient methods for simulation output analysis becomes more pressing. The autoregressive method proposed in this paper uses techniques developed for time series analysis to provide both point and interval estimates for parameters associated with the steady-state distribution. The major advantage of the autoregressive method is obvious. It serves as a black box; users provide the simulation output sequence, the black box will produce results automatically. Furthermore, it seems that the autoregressive method applies to a much broader class of stochastic processes than the regenerative method does. With the generalization to multidimensional processes, the method enables us to apply variance reduction techniques to get more accurate point estimates along with more precise interval estimates. The disadvantages of the autoregressive method are that the covariance matrix obtained by the autoregressive method is just an approximation for the covariance matrix present in the central limit theorem used to construct confidence intervals, and the assumptions put on the system are stricter than we would like.
GRA

N83-26619# Naval Postgraduate School, Monterey, Calif.
GRAPHIC SIMULATIONS OF THE POISSON PROCESS M.S. Thesis
Richard John Davison Oct. 1982 91 p refs
(AD-A123800) Avail: NTIS HC A05/MF A01 CSCL 09/2

This paper presents the results of an effort to develop visual simulations of a variety of stochastic models via a relatively new media, the microcomputer. The theme for this project is the Poisson

process. Four computer programs are provided that simulate the process either by itself or in applications. Represented are a simple and a superimposed Poisson process, an M/M/1 queue, a dam model and a damage model. Descriptions of the programs and instructions to operate them are found in the User Guide. The remainder of this paper will touch upon several aspects of the project and programs that may be of interest to the general reader or of importance to those who may wish to pursue work of this nature. GRA

N83-26620# Michigan State Univ., East Lansing. Dept. of Statistics and Probability.
RISK-EFFICIENT ESTIMATION OF THE MEAN EXPONENTIAL SURVIVAL TIME UNDER RANDOM CENSORING
Joseph C. Gardiner and V. Susarla (State Univ. of New York) Jan. 1983 15 p refs
(Contract N00014-79-C-0522; Grants NIH-PHS-GM-28030; NIH-PHS-GM-28405)
(AD-A123913) Avail: NTIS HC A02/MF A01 CSCL 12/1

The paper proposes a sequential estimator theta of the parameter theta of an exponential distribution when the data is censored. Without any further conditions, it is shown that theta is asymptotically risk efficient when the loss is measured by the squared error loss of estimation of theta plus a linear cost function of the number of observations. In addition, it is shown that theta is asymptotically normal as the cost per observation to zero. Author (GRA)

N83-26621# California Univ., Berkeley. Dept. of Statistics.
SUMS OF FUNCTIONS OF NEAREST NEIGHBOR DISTANCES, MOMENT BOUNDS, LIMIT THEOREMS AND A GOODNESS OF FIT TEST
Peter J. Bickel and Leo Breiman Feb. 1982 65 p refs
(Contracts N00014-75-C-0444; N00014-80-C-0163; N00014-82-K-0054)
(AD-A123902; TR-4) Avail: NTIS HC A04/MF A01 CSCL 12/1

The limiting behavior of sums of functions of nearest neighbor distances is studied for an m dimensional sample. A central limit theorem and moment bounds for such sums, and an invariance principle for the empirical process of nearest neighbor distances are both established. As a consequence the asymptotic behavior of a practicable goodness of fit test is obtained based on nearest neighbor distances. GRA

N83-26622# Illinois Univ., Chicago. Dept. of Quantitative Methods.
MULTI-SAMPLE CLUSTER ANALYSIS USING AKAIKE'S INFORMATION CRITERION
Hamparsum Bozdogan and Stanley L. Sclove 20 Dec. 1982 32 p refs Presented at the 789th Meeting of the Am. Math. Soc., Amherst, Mass., 16-18 Oct. 1981
(Contracts N00014-80-C-0408; DAAG29-82-K-0155; NR Proj. 042-443)
(AD-A123758; TR-82-6) Avail: NTIS HC A03/MF A01 CSCL 12/1

Multi-sample cluster analysis, the problem of grouping samples, is studied from an information-theoretic viewpoint via Akaike's Information Criterion (AIC). This criterion combines the maximum value of the likelihood with the number of parameters used in achieving that value. The multi-sample cluster problem is defined, and AIC is developed for this problem. The form of AIC is derived in both the multivariate analysis of variance (MANOVA) model and in the multivariate model with varying mean vectors and variance-covariance matrices. Numerical examples are presented for AIC and another criterion called w-square. The results demonstrate the utility of AIC in identifying the best clustering alternatives. Author (GRA)

N83-26623# Iowa Univ., Iowa City. Dept. of Statistics and Actuarial Science.
A LIKELIHOOD RATIO TEST REGARDING TWO NESTED BUT OBLIQUE ORDER RESTRICTED HYPOTHESES
Giles Warrack and Tim Robertson Nov. 1982 28 p refs
(Contract N00014-80-C-0321)
(AD-A123746; TR-90) Avail: NTIS HC A03/MF A01 CSCL 12/1

In an article in the Journal of Psychiatric Research, Cadoret, Woolson, and Winokur (1977) consider two theories regarding the genetic makeup of patients suffering from unipolar affective disorder. These two theories imply nested but olique order restrictions on the parameters of a statistical model. A likelihood ratio test for these two restrictions is studied. Author (GRA)

N83-26624# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
ROBUST MINIMUM DISTANCE ESTIMATION OF THE FOUR-PARAMETER GENERALIZED GAMMA DISTRIBUTION M.S. Thesis
Keith F. Shumaker Sep. 1982 70 p refs
(AD-A124077; AFIT-LSSR-27-82) Avail: NTIS HC A04/MF A01 CSCL 12/1

A robust estimation technique (MLDE) is developed which uses minimum distance estimation in conjunction with maximum likelihood estimation (MLE). This technique is then applied to the four-parameter generalized Gamma distribution to obtain location, scale, shape, and power parameter estimates. A Monte Carlo analysis is conducted on three members of the four-parameter generalized Gamma distribution with sample sizes of 12, 16, 20, and 24 for a total of twelve cases. For each of these twelve cases, one thousand samples are generated for the analysis. Initial estimates of the location, scale, shape, and power parameters are found using a maximum liklihood estimator. Minimum distance estimation using the Anderson-Darling statistic is then employed to obtain a new estimate of the location parameter. Finally, this new improved location parameter estimate is used to refine the scale, shape, and power parameter estimates through maximum likelihood estimation. The performance of the MLDE technique is determined through use of mean square error and relative efficiency measures. Author (GRA)

N83-26625# Massachusetts Inst. of Tech., Cambridge. Statistics Center.
ESTIMATION IN THE PRESENCE OF NOISE OF A SIGNAL WHICH IS FLAT EXCEPT FOR JUMPS. PART 2: THE EMPIRICAL BAYES APPROACH
Yi-Ching Yao Jan. 1983 17 p refs
(Contract N00014-75-C-0555; NR Proj. 609-001)
(AD-A124116; TR-ONR-28) Avail: NTIS HC A02/MF A01 CSCL 12/1

This is the second of a two-part paper. In the first part Yao (1982), a special Bayesian Model A is studied in detail. In this part, a more general model is proposed and studied in an empirical Bayes framework. The results for Model A are applied to step-function signals using the ideas of empirical Bayes and maximum likelihood applied to the parameters of the Bayesian Model A. An efficient computational method is proposed to approximate the likelihood function under Model A. Several empirical Bayes estimators of the unknown step-function signal are compared by simulation. Author (GRA)

N83-26626# Massachusetts Inst. of Tech., Cambridge. Statistics Center.
ESTIMATION IN THE PRESENCE OF NOISE OF A SIGNAL WHICH IS FLAT EXCEPT FOR JUMPS. PART 1: A BAYESIAN STUDY
Yi-Ching Yao Nov. 1982 27 p refs
(Contract N00014-75-C-0555; NR Proj. 609-001)
(AD-A124115; TR-ONR-25) Avail: NTIS HC A03/MF A01 CSCL 17/2

Consider the problem of estimating, in a Bayesian framework and in the presence of additive Gaussian noise, a signal which is a random step function. The best linear estimates, the Bayes estimates and the estimates with known change points are derived, evaluated and compared analytically and numerically. A characterization of the Bayes estimates is presented. This characterization has a reasonable interpretation and also provides

a way to compute the Bayes estimates with a number of operations of the order of T where T is the fixed time span. An approximation to the Bayes estimates is proposed which is reasonably good and reduces the total number of operations to the order of T.
Author (GRA)

N83-26627# Naval Research Lab., Washington, D. C. Aerospace Systems Div.
ON THE SOLUTION OF A FOKKER-PLANCK EQUATION IN THE PRESENCE OF CORRELATED NOISE Final Report
Henry N. Ho and Roger H. Lang (George Washington Univ.) 29 Dec. 1982 13 p refs
(AD-A124114; NRL-8651) Avail: NTIS HC A02/MF A01 CSCL 12/1

The Fokker-Planck equation corresponding to the first-order phase-locked loop in the presence of exponentially correlated noise is studied. For the case of zero signal-to-noise ratio and aero initial detuning an analytical solution is obtained for the Fokker-Planck equation, reduced modulo 2 pi. The solution is the transition probability density function (p.d.f.) and gives explicit relationships between loop parameters and the transient behavior of the phase error process. From the transition p.d.f. the transition cumulative distribution function and the time-dependent variance of phase error are easily obtained. At sufficiently small values of Dt, where D is the diffusion constant and t is the time, the transition p.d.f. provides a good approximation to the probability of loss of lock in the loop. Author (GRA)

N83-26628# Maryland Univ., College Park. Dept. of Management Sciences and Statistics.
SOME MULTIVARIATE DISTRIBUTIONS ARISING IN THE FAULTY SAMPLING INSPECTION
Norman L. Johnson and Samuel Kotz (North Carolina Univ.) Jun. 1983 19 p refs Presented at the 6th Intern. Symp. on Multivariate Analysis, Pittsburgh, Jul. 1983
(Contract N00014-81-K-0301; Grant NSF MCS-80-21704)
(AD-A124018; Rept-83-1) Avail: NTIS HC A02/MF A01 CSCL 12/1

In the present paper we extend in two ways some results relating to the study of distributional aspects of effects of errors in inspection sampling: (1) Multistage sampling with k successive samples involving the possibility of two types of errors in inspection (classifying a defective individual as non-defective, or a non-defective as defective); (2) Single-stage sampling considering several types of defects of which only one is tested on inspection. Both (1) and (2) lead to novel multivariate distributions. Their structural properties are analysed in some detail and some applications, in particular those in quality control are discussed.
GRA

N83-26629# Florida State Univ., Tallahassee. Dept. of Statistics.
PAIRED COMPARISONS
Ralph A. Bradley May 1982 49 p refs
(Contract N00014-80-C-0093)
(AD-A123877; FSU-STATISTICS-M615; ONR-TR-157) Avail: NTIS HC A03/MF A01 CSCL 12/1

Interest in paired comparisons in statistics and psychometrics has developed in the contexts of the design of experiments, nonparametric statistics, and scaling, including multidimensional scaling. Applications have arisen in many areas, but most notably in food technology. marketing research, and sports competition. Paired comparisons have been considered in design of experiments as incomplete block designs with block size two by Clatworthy and others. Scheffe developed and analysis of variance for paired comparisons with consideration for possible order effects for the two treatments within blocks. When the usual parametric models of analysis of variance are imposed, the analysis of such designs follows standard methods and will not be discussed here. GRA

N83-26630# Florida State Univ., Tallahassee. Dept. of Statistics.
MINIMAX ESTIMATION OF A MULTIVARIATE NORMAL MEAN UNDER A QUADRATIC LOSS FUNCTION WITH UNKNOWN WEIGHTS
Pi-Erh Lin and Amany M. Mousa Jun. 1982 19 p refs
(Contract N00014-80-C-0093)
(AD-A123892; FSU-STATISTICS-M633; TR-158-ONR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper considers the minimax estimation of mu by delta relative to a certain quadratic loss function with unknown weights. To the best of our knowledge, this is the first time in the literature a loss function of this type is considered in estimating mu. The minimax estimation of mu relative to other types of quadratic loss functions has been extensively studied since Stein (1956) showed that the maximum likelihood estimator chi, is inadmissible, when p greater than or equal to 3, relative to the loss function given by a stated equation. GRA

N83-26631# Southern Methodist Univ., Dallas, Tex. Dept. of Statistics.
PREDICTION INTERVALS USING EXCEEDANCES FOR AN ADDITIONAL THIRD STAGE SAMPLE
D. B. Owen and Youn-Min Chou (Texas Univ.) 15 Feb. 1983 13 p refs
(Contract N00014-76-C-0613)
(AD-A125015; TR-173) Avail: NTIS HC A02/MF A01 CSCL 12/1

Prediction intervals are extended to a third sampling stage involving the distribution of the t-th smallest value in a third stage sample which exceeds the k-th smallest value in the second sample. Procedures and tables are given for two situations. In the first situation the usual 2-stage prediction interval has been applied, and a third stage is now required. Sample sizes are given for this problem. In the second situation we know in advance that three stages will be necessary and the factors are given for the required procedure. Author (GRA)

N83-26632# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
LINEAR SUFFICIENCY AND SORE APPLICATIONS IN MULTI-LINEAR ESTIMATION
Hilmar Drygas Oct. 1982 23 p refs
(Contract F49620-82-K-0001; AF Proj. 2304)
(AD-A125152; TR-82-30; AFOSR-83-0007TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

In the linear model Y = B beta + u the question arises when a linear transformation z = Ly contains all information of the linear model. This problem was solved by Baksalary and Kala, Drygas and J. Mueller. As an application we consider the estimation of the variance of the observations, its skewness and its kurtosis. This is done by considering so-called derived models. Linear sufficient statistics are derived for these problems. Author (GRA)

N83-26633# Southern Methodist Univ., Dallas, Tex. Dept. of Statistics.
ONE-SIDED PREDICTION INTERVALS FOR 3-STAGE SAMPLING FROM A NORMAL POPULATION
Youn-Min Chou and D. B. Owen 15 Feb. 1983 18 p refs
(Contract N00014-76-C-0613)
(AD-A125060; TR-174) Avail: NTIS HC A02/MF A01 CSCL 12/1

One-sided prediction intervals for a normal population are extended to a third sampling stage. Procedures and tables are given for two situations. In the first situation, methods for obtaining such intervals are presented, and tables for calculating such prediction intervals are provided. In the second situation, a two-stage prediction interval has been applied, and a third stage is now required. Sample sizes are given for the third stage.
Author (GRA)

N83-26634# Pacific Northwest Lab., Richland, Wash.
ESTIMATING TAIL PROBABILITIES
D. B. Carr and H. D. Tolley Dec. 1982 43 p refs
(Contract DE-AC06-76RL-01830)
(DE83-005241; PNL-4580) Avail: NTIS HC A03/MF A01

Procedures for univariate nonparametric estimation of tail probabilities are investigated. Extrapolated values for tail probabilities beyond the data are also obtained based on the shape of the density in the tail. Several estimators which use exponential weighting are described. These are compared in a Monte Carlo study to nonweighted estimators, to the empirical cdf, to an integrated kernel, to a Fourier series estimate, to a penalized likelihood estimae and a maximum likelihood estimate. Selected weighted estimators are shown to compare favorably to many of these standard estimaators for the sampling distributions investigated. DOE

N83-26635# Research Inst. of National Defence, Stockholm (Sweden).
ON THE PROBABILITY OF FINDING A CERTAIN MOVING TARGET
Staffan Wrigge Dec. 1982 39 p refs
(FOA-C-10224-M8) Avail: NTIS HC A03/MF A01

The probability that a target will be within the center of the seeking area when a missile target seeker is activated is considered for the two dimensional case. Methods based on Bessel functions and a geometrical method are employed. Random errors with a general bivariate normal distribution and with a distribution associated with the elliptic integral are treated. Author (ESA)

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N83-26636# California Univ., Los Angeles. School of Engineering and Applied Science.
ALGORITHMS FOR DIFFERENTIAL GAMES WITH BOUNDED CONTROL AND STATES Final Report, 29 Nov. 1979 - 28 Nov. 1981
Aran Chompaisal Mar. 1982 158 p
(Contract DASG60-80-C-0007)
(AD-A124643) Avail: NTIS HC A08/MF A01 CSCL 12/1

Pursuit and Evasion problems are probably the most natural application of differential game theory and have been treated by many authors as such. Very few problems of this class can be solved analytically. Fast and efficient numerical algorithm is needed to solve for an optimal or near optimal solution of a realistic pursuit and evasion differential game. Some headways have been made in the development of numerical algorithm for this purpose. Most researchers, however, worked under an assumption that a saddle point exists for their differential game. Here, it is shown via two examples and a nonlinear stochastic differential game that such is not the case. A first-order algorithm for computing an optimal control for each player, subject to control and/or state constraints, is developed without the assumption of saddle point existence. It is shown that a linear quadratic differential game with control and/or state constraints generally cannot be solved analytically. One such problem is developed and solved by the above algorithm. A new rationalization is offered in formulating a missile anti-missile problem as a nonlinear stochastic differential game. The algorithm developed here together with a convergence control method introduced by Jarmark is used to solve the missile anti-missile problem with fast computation time.
Author (GRA)

N83-26637# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN INTERACTIVE BOMBING MISSION SIMULATION WITH COMPUTER GRAPHICS INTERFACE M.S. Thesis
Michael J. Goci Dec. 1982 151 p refs
(AD-A124661; AFIT/GCS/MA/82D-4) Avail: NTIS HC A08/MF A01 CSCL 09/2

An interactive flight simulation with computer graphics interface was designed using top-down structured analysis techniques. The project converts a passive bombing mission simulation used in the Avionics Laboratory, Air Force Wright Aeronautical Laboratories at Wright-Patterson AFB, into an interactive, real-time, man-in-loop simulation. The design was documented using SofTech's Structured Analysis and Design Technique (SADT) then coded in FORTRAN. The graphics were implemented using TEKTRONIX PLOT-10 software and the system operates on a VAX-11/780 computer coupled through a TEKTRONIX 4016 terminal. Author (GRA)

N83-26638# Research Inst. of National Defence, Stockholm (Sweden).
FACTS, METHODS, PROGRAMS AND PARADIGMS
Per Agrell Jul. 1982 18 p refs
(FOA-C-10210-M8) Avail: NTIS HC A02/MF A01

A methodological taxonomy of concepts for use by operations research analysts is described. The yin-yang form is proposed with intuition, interaction, creativity and subject in the maternal yin column; rationality, advice, analysis and object in the male, yang column; and paradigms, programs, methods and facts in the first column. Author (ESA)

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

No abstracts in this category.

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N83-26639*# Wisconsin Univ., Madison. Dept. of Metallurgical and Mineral Engineering.
SOLIDIFICATION OF UNDERCOOLED LIQUIDS
J. H. Perepezko, Y. Shiohara (MIT, Cambridge), J. S. Paik, and M. C. Flemmings (MIT, Cambridge) [1982] 17 p refs
(NASA-CR-172629; NAS 1.26:172629) Avail: NTIS HC A02/MF A01 CSCL 20L

During rapid solidification processing (RSP) the amount of liquid undercooling is an important factor in determining microstructural development by controlling phase selection during nucleation and morphological evolution during crystal growth. While undercooling is an inherent feature of many techniques of RSP, the deepest undercoolings and most controlled studies have been possible in carefully prepared fine droplet samples. From past work and recent advances in studies of nucleation kinetics it has become clear that the initiation of crystallization during RSP is governed usually by heterogeneous sites located at surfaces. With known nucleant sites, it has been possible to identify specific pathways of metastable phase formation and microstructural development in alloys. These advances have allowed for a clearer assessment of the interplay between undercooling, cooling rate and particle size statistics in structure formation. New approaches to the examination of growth processes have been developed to follow the thermal behavior and morphology in small samples in the period of rapid crystallization and recalescence. Based upon the new experimental information from these studies, useful models can be developed for the overall solidification process to include nucleation behavior, thermodynamic constraints, thermal history, growth kinetics, solute redistribution and resulting structures. From the refinement of knowledge concerning the underlying factors that govern RSP a basis is emerging for an effective alloy design and processing strategy. Author

N83-26640# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
AIR FORCE TECHNICAL OBJECTIVE DOCUMENT, FISCAL

YEAR 1984
Jan. 1983 93 p Supersedes AFWAL-TR-81-2129
(AF Proj. 9991)
(AD-A125075; AFWAL-TR-83-2001; AFWAL-TR-81-2129) Avail: NTIS HC A05/MF A01 CSCL 21/5

This Technical Objective Document (TOD) has been prepared by the Aero Propulsion Laboratory to provide science and industry with specific technical objectives which the Air Force feels are critical to maintain aerospace superiority in the future. The TOD contains eight technology planning objectives which cover the technical disciplines of airbreathing propulsion, aerospace vehicle power, fire protection, and aircraft and missile fuels and lubrication. Author (GRA)

N83-26641# Los Alamos Scientific Lab., N. Mex.
INTERNAL MAGNETIC FIELDS IN hcp-IRON
R. D. Taylor, G. Cort, and J. O. Willis 1982 8 p refs Presented at the 3rd Joint Intermag-Magnetism and Magnetic Mater. Conf., Montreal, Canada, 17-23 Jul. 1982
(Contract W-7405-eng-36)
(DE82-018109; LA-UR-82-2129; CONF-820727-1) Avail: NTIS HC A02/MF A01

The magnetic behavior of hcp-Fe (epsilon iron) was investigated by the Moessbauer effect over a wide range of temperature T, pressure P, and applied magnetic field H(o). The internal field H.sub i/ of the induced moment is given by H/sub i/ = 0.20 +- .01 H(o) and is independent of T and P. Enhanced paramagnetism is suggested as the most likely origin for a contribution of this magnitude to H/sub i/. DOE

N83-26642# National Inst. voor Kernfysica en Hoge Energiesica, Amsterdam (Netherlands).
ACTIVITIES REPORT IN NUCLEAR PHYSICS AND HIGH-ENERGY PHYSICS Annual Report, Jan. 1981 - Jun. 1982
1982 117 p refs
Avail: NTIS HC A06/MF A01

Electron scattering, pion, muon and baryon physics, theoretical nuclear and high energy physics, and radio and nuclear chemistry research is summarized. Topics include: electron scattering at 500 and 140 MeV stations; pion-muon test facilities; hot atom chemistry; radiation chemistry and pulse radiolysis; labeling of organic molecules; isotope production; dosimetry and instrumentation. Author (ESA)

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution*.

N83-26643*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A COMPACT INFLOW CONTROL DEVICE FOR SIMULATING FLIGHT FAN NOISE
L. Homyak, J. G. McArdle, and L. J. Heidelberg 1983 11 p refs Presented at the 8th Aeroacoustics Conf., Atlanta, 11-13 Apr. 1983; sponsored by AIAA Previously announced in IAA as A83-28005 (NASA-TM-83349; E-1606; NAS 1.15:83349; AIAA-83-0680) Avail: NTIS HC A02/MF A01 CSCL 20A

Inflow control device (ICD's) of various shapes and sizes have been used to simulate inflight fan tone noise during ground static tests. A small, simple inexpensive ICD design was optimized from previous design and fabrication techniques. This compact two-fan-diameter ICD exhibits satisfactory acoustic performance characteristics without causing noise attenuation or redirection. In addition, it generates no important new noise sources. Design and construction details of the compact ICD are discussed and acoustic performance test results are presented. Author (IAA)

N83-26644*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMPARISON OF MEASURED AND CALCULATED MODE REDISTRIBUTION ASSOCIATED WITH SPINNING MODE TRANSMISSION THROUGH CIRCUMFERENTIALLY SEGMENTED LINED DUCTS
Tony L. Parrott and Willie R. Watson Mar. 1983 25 p refs
(NASA-TM-84576; L-15548; NAS 1.15:84576) Avail: NTIS HC A02/MF A01 CSCL 20A

An experiment was conducted to investigate mode redistribution in lined circular ducts with circumferential impedance nonuniformities. Mode insertion losses were measured for six-segment, two-segment, and uniform liners in a spinning mode synthesizer (SMS) in the quiet flow facility in the Langley Aircraft Noise Reduction Laboratory and correlated with predicted transmission losses. Both experiment and theory show that circumferentially segmented duct liners do scatter energy into circumferential modes of different orders. Good agreement measured and calculated attenuations was obtained for circumferential mode numbers paired with zero order radial mode numbers. For the higher order radials, the agreement was not as good. Author

N83-26645*# Bionetics Corp., Hampton, Va.
MEASUREMENTS AND OBSERVATIONS OF NOISE FROM A 4.2 MEGAWATT (WTS-4) WIND TURBINE GENERATOR
Kevin P. Shepherd and Harvey H. Hubbard (William and Mary Coll., Newport News, Va.) May 1983 33 p refs
(Contract NAS1-16978; Grant NAG1-166)
(NASA-CR-166124; NAS 1.26:166124) Avail: NTIS HC A03/MF A01 CSCL 20A

Noise measurements and calculations are being made for large wind turbine generators to develop a data base for use in designing and siting such systems for community acceptance. As part of this program, measurements were made on the WTS-4 wind turbine generator during its acceptance runs. This paper presents the results of these exploratory measurements for power output conditions in the range 1.0 to 4.2 MW. Data include noise levels, spectra, radiation patterns, effects of distance, and the associated perception thresholds for use in the further development of acceptance criteria for this type of machine. B.W.

N83-26646*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SONIC LEVITATION APPARATUS Patent Application
Stanley A. Dunn (Bjorkstein Research Lab.), Alan R. Pomplun (Bjorksten Research Lab.), Elmer G. Paquette (Bjorksten Research Lab.), Edwin C. Ethridge, and Jerry L. Johnson, inventors (to NASA) Filed 12 May 1983 18 p
(NASA-Case-MFS-25828-1; US-Patent-Appl-SN-493866) Avail: NTIS HC A02/MF A01 CSCL 20A

A sonic levitation apparatus is disclosed which includes a sonic transducer which generates acoustical energy responsive to the level of an electrical amplifier. A duct communicates with an acoustical chamber to deliver an oscillatory motion of air to a plenum section which contains a collimated hole structure having a plurality of parallel orifices. The collimated hole structure converts the motion of the air to a pulsed, unidirectional stream providing enough force to levitate a material specimen. Particular application to the production of microballoons in low gravity environment is discussed. NASA

N83-26647# Pennsylvania State Univ., University Park. Applied Research Lab.
WATERBORNE NOISE DUE TO OCEAN THERMAL ENERGY CONVERSION PLANTS
C. P. Janota and D. E. Thompson 17 Jun. 1982 53 p refs Submitted for publication
(Contract N00024-79-C-6043)
(AD-A124174; ARL/PSU/TM-82-129) Avail: NTIS HC A04/MF A01 CSCL 20/1

Public law reflects a United States national commitment to the rapid development of Ocean Thermal Energy Conversion (OTEC) as an alternate energy source. OTEC plants extract the stored solar energy from the world's tropical seas and in so doing pose a potential for altering the character of the ambient noise there. The sources of noise from an OTEC plant are analyzed in the context of four configurations, two of which were built and

tested, and two which are concepts for future full-scale moored facilities. The analysis indicates that the noise resulting from the interaction of turbulence with the sea-water pumps is expected to dominate in the frequency range 10 Hz to 1 kHZ. Measured radiated noise data from the OTEC-I research plant, located near the island of Hawaii, are compared with the analysis. The measured data diverge from the predicted levels at frequencies above about 60 Hz because of dominant non-OTEC noise sources on this platform. However, at low frequency, the measured broadband noise is comparable to that predicted. GRA

N83-26648# Admiralty Marine Technology Establishment, Teddington (England).
FREE-WAVE PROPAGATION IN AND SOUND RADIATION BY LAYERED MEDIA WITH FLOW
W. J. Spicer Dec. 1982 25 p refs
(AD-A124522; DRIC-BR-86502; AMTE(N)-TM-82102) Avail: NTIS HC A02/MF A01 CSCL 20/1

The layered system is composed of elastic, viscous and acoustic layers bounded by upper and lower acoustic half-spaces. Uniform subsonic flows may be present in the acoustic layers and half-spaces. The method of dynamic stiffness coupling is used to obtain the system dynamic stiffness matrix which connects 'spectral' displacements and external stresses at the interfaces. Far-field sound radiation and the wavenumbers of free-waves are found from this matrix relation. Numerical results include wavenumber-frequency plots which exhibit the characteristics of instabilities. Author (GRA)

N83-26649# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
A GRAPHIC METHOD FOR PREDICTING AUDIBILITY OF NOISE SOURCES Final Technical Report, Jun. - Oct. 1982
Sanford Fidell and Richard Horonjeff Wright-Patterson AFB, Ohio AFWAL Oct. 1982 41 p refs
(Contract F33615-82-M-3221; AF Proj. 2401)
(AD-A123736; AFWAL-TR-82-3086; BBN-4954) Avail: NTIS HC A03/MF A01 CSCL 06/16

This report provides the technical rationale for revision of a chart developed by Fidell, Pearsons, and Bennett (1972). This chart expresses the relationships between signal-to-noise ratio and frequency that govern detectability of acoustic signals by human observers. The chart permits a user: (1) to predict the frequency region of a spectrum that is most detectable in any given ambient noise background; (2) to quantify the degree of detectability of the signal in question; and (3) to estimate reduction in signal-to-noise ratio necessary to render the signal undetectable. Author (GRA)

N83-26650# Illinois Univ., Urbana. Coordinated Science Lab.
ANALYSIS OF NON-PERIODIC SURFACE ACOUSTIC WAVE TRANSDUCERS AND REFLECTORS M.S. Thesis
Anthony L. Lentine May 1980 43 p refs
(Contracts N00014-79-C-0424; F19628-78-C-0040)
(AD-A123991; R-883; UILU-ENG-80-215) Avail: NTIS HC A03/MF A01 CSCL 09/1

In this report, a method is presented to calculate the response of non-periodic surface acoustic wave transducers, and also a method that can be used to calculate the reflection and phase shift of non-periodic reflective arrays. The methods do not consider mechanical effects, so grooved reflector arrays can not be analyzed. However a large majority of surface wave devices can be analyzed using one or both of these two methods. GRA

N83-26651# Mississippi Univ., University. Lab. for Acoustics Research.
OPTICAL SOUND GENERATION AND AMPLIFICATION Annual Summary Report
Henry E. Bass, Lawrence A. Crum, and F. Douglas Shields 15 Jan. 1983 66 p refs
(Contract N00014-81-K-0691; NR Proj. 384-836)
(AD-A124015; REPT-1-83) Avail: NTIS HC A04/MF A01 CSCL 20/1

This task is devoted to optical generation of sound at audible frequencies. The optical source of energy must be modulated to produce a time dependent heating and this time dependent heating is then converted to a pressure variation. We have been considering conversion from light to sound in a gas (classical spectrophone) and at a surface (as observed by Alexander G. Bell). GRA

N83-26652# TRW, Inc., Redondo Beach, Calif. Electronic Systems Group.
SHALLOW BULK ACOUSTIC WAVE (SBAW) DEVICES AND OSCILLATORS Annual Report, 28 Aug. 1981 - 2b Aug. 1982
K. V. Rousseau, K. H. Yen, K. F. Lau, and A. E. Faris Fort Monmouth, N.J. Army Electronics Research and Development Command Nov. 1982 91 p refs
(Contract DAAK20-81-C-0415)
(AD-A123966; DELET-TR-81-0415-1; AR-1) Avail: NTIS HC A05/MF A01 CSCL 09/5

The objective of this program is to develop stable shallow bulk acoustic wave (SBAW) oscillators, stabilized directly at L through X band frequencies. This first annual report describes the technical progress of the program for the period of September 1981 to August 1982. The major activities for this period were the examination of system applications of SBAW oscillators, SBAW device investigation, device fabrication, and oscillator circuit design. The parameters studied in the SBAW device investigation were material aspects, metallization effect, transducer configuration, equivalent circuit, and harmonic operation. Device fabrication has concentrated on delay lines operating at frequencies from 3 to 5 GHz, and results have been obtained for device mounting and packaging. SBAW oscillator circuit designs have been developed and are in fabrication. Several systems have been identified in which the use of high frequency SBAW devices will greatly improve system performance. From the system study, it is clear that as more and more weapon systems move to millimeter wave, there will be an increasing requirement for stable, low noise frequency sources and precision test equipment. SBAW technology will provide the devices which will be needed to meet this challenge. Author (GRA)

N83-26653# Naval Postgraduate School, Monterey, Calif.
MEASUREMENTS OF ACOUSTIC AMBIENT NOISE IN SHALLOW WATER DUE TO BREAKING SURF
O. B. Wilson, Jr., Stephen N. Wolf, and Frank Ingenito Dec. 1982 38 p refs
(RR0000110)
(AD-A123964; NPS1-83-006) Avail: NTIS HC A03/MF A01 CSCL 20/1

Horizontal directionality of ambient noise was measured at ranges up to 15 km from the south-eastern shore of Monterey Bay, California. Water depths at the sites ranged from 8 to 175 m. A steerable cardioid receiving pattern was formed using signals telemetered from dipole and omnidirectional hydrophones suspended from tethered buoys. With no nearby shipping, whenever the maximum of the cardioid pattern was directed toward the beach, noise levels in the frequency range from 20 Hz to 70 Hz were greater than those obtained when the maximum was directed seaward. This difference or anisotropy (seaward vs. shoreward), which depends on range from the beach, on frequency and on surf intensity, was 10 dB at 300 Hz at the 9 km site during very heavy surf. Surf beat was clearly audible when the cardioid maximum was steered shoreward at ranges as great as 2 km. During heavy surf, the omnidirectional ambient noise levels also increased significantly in the same frequency range at which the anisotropy is evident. The anisotropy effects diminish both in magnitude and in frequency range with lower wave height but are still observable during light surf. We have concluded that intense breaking surf can contribute significantly to ambient noise in fairly deep continental shelf waters. Author (GRA)

N83-26654# European Space Agency, Paris (France).
GENERATION OF NOISE BY TURBULENCE
Robert Legendre Jan. 1983 81 p refs Transl. into ENGLISH of "Bruits emis par la Turbulence', ONERA, Paris Report ONERA-NT-1981-3, 1981 Original report in FRENCH previously announced

as N82-24946
(ESA-TT-763; ONERA-NT-1981-3) Avail: NTIS HC A05/MF A01

Noise generated within a fluid by turbulent flow of high Reynolds number, particularly by that of the flow inside a jet, is discussed. A definition of noise based on acoustic potential is proposed. The equation valid for this potential is established using an almost complete elimination of state variables, and is linearized. Analysis of convection and refraction effects shows that the generated noise is proportional to the density relative variation rate. A model of anisotropic turbulence inside a shear flow which shows that the noise generated inside a vortex tube is proportional to the square of the circulation is presented. Author (ESA)

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N83-26655# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
VARIATIONAL CALCULATION OF ELECTRON ELASTIC SCATTERING BY ATOMIC HELIUM M.S. Thesis
Paul Joseph Chernek Dec. 1982 52 p refs
(AD-A124721; AFIT/GEP/PH/82D-3) Avail: NTIS HC A04/MF A01 CSCL 20/8

The elastic-scattering of electrons from atomic helium in the ground state is investigated. It is shown that for low energy incident electrons the scattering problem reduced to solving an ordinary integro-differential equation for the scattering wave-function. A method is discussed to obtain approximate solutions to the integro-differential equation by variational principles. The extremum condition of the variational method is formulated into a general N x N matrix equation which reduces to a 2 x 2 eigen-value matrix problem for the phase-shift of the scattering electron. An algorithm is presented to obtain the collisional cross-section for elastic scattering as a function of incident electron energy.
Author (GRA)

N83-26656# Harvard Univ., Cambridge, Mass. Div. of Applied Sciences.
PERMANENT MAGNET PROPERTIES OF IN SITU FORMED Cu-Fe MULTIFILAMENTARY COMPOSITES Interim Report
G. Dublon, F. Habbal, and J. L. Bell Jul. 1982 18 p refs
(Contract N00014-77-C-0002; Grant NSF MRL-80-20247; NR Proj. 039-136)
(AD-A123911; TR-23) Avail: NTIS HC A02/MF A01 CSCL 09/1

Cu-Fe multifilamentary composites with up to 60 vol% Fe were prepared in situ. Magnetic hysteresis loops were obtained at room temperature as a function of composition, cross sectional area reduction, up to 99.9996%, and annealing conditions. Hci and (B.H)max increase with cross sectional area reduction and show pronounced changes on annealing. Hci = 600, 520 and 380 Oe and Mr = 5.6, 8.2 and 11.9 KG were measured in the smallest 30, 45 and 60 vol% Fe composites, respectively, following optimal heat treatment. (B.H)max = 3.2 MG.Oe was measured in both Cu-45 vol% Fe and Cu-60 vol% Fe with hysteresis loop squareness of 0.95. Considering the excellent mechanical and transport properties, inexpensive constituent elements and simple preparation, the in situ formed Cu-Fe composites appear to have the potential for permanent magnet applications. GRA

N83-26657# Chemical Dynamics Corp., Columbus, Ohio.
COMPUTATIONAL STUDY OF NONADIABATIC EFFECTS IN ATOM-MOLECULE REACTIVE SCATTERING Final Technical Report
Bruce C. Garrett, Michael J. Redmon, and Lowell D. Thomas 15 Nov. 1982 119 p refs
(Contract F49620-81-C-0046; AF Proj. 2303)
(AD-A125135; AFOSR-83-0002TR) Avail: NTIS HC A06/MF A01 CSCL 07/4

This report describes an eighteen month research program designed to develop theoretical methods for studying nonadiabatic effects in atom-diatomic molecule collisions. A method for computing accurate three-dimensional reactive scattering wavefunctions has been developed. A method for including several electronic states in a molecular scattering calculation has been implemented. An interactive formulation of the exchange kernal approach to reactive scattering has been examined, and is found to have features that warrant its development for problems involving large numbers of coupled equations. A version of the method incorporating finite element techniques has been programmed and preliminary testing has begun on HF-HF self-relaxation. The current code needs refinement and is presently not programmed to allow for reaction. It is anticipated that this approach will allow treatment of several thousand coupled equations on the new generation of supercomputers. Applications of these numerical methods are being made to several molecular systems, including collisions of atomic sodium, oxygen and fluorine with molecular hydrogen. GRA

N83-26658# Brookhaven National Lab., Upton, N. Y. Dept. of Energy and Environment.
LONG-RANGE ATTRACTION IN THE COLLISIONS OF FREE-MOLECULAR AND TRANSITION-REGIONS AEROSOL PARTICLES
William H. Marlow 1982 27 p refs Presented at the 13th Intern. Symp. on Rarefied Gas Dyn., Novosibirsk, USSR, 5-9 Jul. 1982
(Contract DE-AC02-76CH-00016)
(DE82-019527; BNL-31561; CONF-820742-1) Avail: NTIS HC A03/MF A01

Recent advances in the description of the compositional dependences of free molecular and transition regime aerosol collision rates that are essential to the understanding of the evolution of this nonequilibrium condition of matter are reviewed. To set the physical context, selected current advances in homogeneous nucleation theory are described. These results, which are based upon metastable equilibrium prior to the onset of nucleation, are related to the nonequilibrium collisions of post-critical nuclei or aerosols. Since all particles interact via attractive potentials whose mathematical forms become singular at contact, a new procedure is described which has been developed for computing the free molecular collision rates of spherical particles that both exploits this singularity and is readily generalizable to transition regime collisions. The physics of the molecular van der Waals interactions and its mathematical form for interacting point dipoles with arbitrary retardation are reviewed. DOE

N83-26659# Brookhaven National Lab., Upton, N. Y.
STRANGENESS EXCHANGE REACTIONS AND HYPERNUCLEI
Carl B. Dover 1982 24 p refs Presented at the 2nd LAMPF Workshop, Los Alamos, N. Mex., 19 Jul. 1982
(Contract DE-AC02-76CH-00016)
(DE82-010376; BNL-31674; CONF-820745-1) Avail: NTIS HC A02/MF A01

Recent progress in the spectroscopy of sigma and lamdba and hypernuclei is reviewed. Prospects for the production of doubly strange hypernuclei at a future kaon factory are assessed. It is suggested that the (K-, K+) reaction on a nuclear target may affort an optimal way of producing the H dibaryon, a stable six quark object with J/sup pi/ = O+, S = 2. DOE

N83-26660# Florida State Univ., Tallahassee.
DESIGN OF EXPERIMENTS TO ASSESS GAS-COMPOSITION EFFECTS ON ELECTRON-BEAM IONIZATION
Okihiro Tokunaga (Japan Atomic Energy Research Inst., Takasaki) 1982 15 p refs Presented at the Electron Beam Workshop, Arlington, Va., 25-26 Feb. 1982
(Contract DE-AC21-81MC-16229)
(DE82-019410; CONF-820256-1) Avail: NTIS HC A02/MF A01

Utilization of electron beam ionization for particle precipitation in conventional systems or in combined treatment systems depends upon the properties of gases subjected to irradiation. The properties of the gases become even more important where secondary ionization is to be used, since the magnitude and stability of

secondary ionization currents are governed by attachment of free electrons to component molecule and ionic recombination reaction of electrons. Since stack gases are oxygen depleted and further since the gases in the electron beam treatment systems contain variable amounts of other gases, a series of experiments have been initiated for a study to investigate on the electron beam ionization for a number of model gases. Results are discussed. DOE

N83-26661# National Bureau of Standards, Washington, D.C. Surface Science Div.
DETERMINATION OF MOLECULAR STRUCTURE AT SURFACES USING ANGLE-RESOLVED ELECTRON- AND PHOTON-STIMULATED DESORPTION
T. E. Madey, F. P. Netzer, J. E. Houston, D. M. Hanson, and R. Stockbauer 1 Jul. 1982 22 p refs Presented at the DIET-1 Workshop, Williamsburg, Va., 12-14 May 1982
(Contract DE-AC04-76DP-00789)
(DE83-005855; SAND-83-0040C) Avail: NTIS HC 02/MF A01

Recent data and theoretical models related to the use of angle-resolved electron and photon stimulated desorption in determining the structures of molecules at surfaces are reviewed. Examples include a variety of structural assignments based on ESDIAD (electron stimulated desorption ion angular distributions), the observation of short-range local ordering effects induced in adsorbed molecules by surface impurities, the influence of electron-beam damage on surface structure, and a direct comparison of ESD and PSD ion yields for the same system. DOE

N83-26662# California Univ., Livermore. Lawrence Livermore Lab.
OPTICAL-EMISSION STUDIES IN THE ION-FOCUSED REGIME
Y. P. Chong, Simon S. Yu, J. A. Masamitsu, T. J. Fessenden, and D. S. Prono 5 Jan. 1983 15 p refs
(Contract W-7405-eng-48; ARPA Order 4395)
(DE83-006416; UCID-10664) Avail: NTIS HC A02/MF A01

The utility of optical emissions for diagnostic purposes in the ion-focused regime is explored. Two possible uses of the emissions are examined: (1) the time delay of 337.1-nm emissions relative to 391.4-nm emissions is observed to scale with the beam-neutralization time, and (2) emissions at 391.4 nm may determine beam-current density at the front of the beam. DOE

N83-26663# State Univ. of New York, Stony Brook.
MULTIPHOTON INTERACTIONS IN MOLECULES WITH PICOSECOND LASER PULSES
H. S. Kwok 4 Mar. 1982 6 p refs
(Contract DE-AC02-81ER-2011959)
(DE82-011959; DOE/ER-10978/1) Avail: NTIS HC A02/MF A01

A picosecond CO2 laser system for laser spectroscopy is described. A method for analyzing photochemical reaction products utilizing a Varian 3700 series gas chromatography with a flame ionization detector is considered. DOE

N83-26664# Oak Ridge National Lab., Tenn.
PRACTICAL APPLICATIONS OF ACTIVATION ANALYSIS AND OTHER NUCLEAR TECHNIQUES
W. S. Lyon 1982 13 p refs Presented at Intern. Symp. on Appl. and Technol. of Ionizing Radiations, Malaz, Riyadh, Saudi Arabia, 12 Mar. 1982
(Contract W-7405-eng-26)
(DE82-009479; CONF-820335-3) Avail: NTIS HC A02/MF A01

Neutron activation analysis is a versatile, sensitive multielement, usually nondestructive analytical technique used to determine elemental concentrations in a variety of materials. Samples are irradiated with neutrons in a nuclear reactor removed, and for the nondestructive technique, the induced radioactivity measured. This measurement of gamma rays emitted from specific radionuclides makes possible the quantitative determination of elements present. The method is described, advantages listed and a number of examples of its use given. Two other nuclear methods, particle induced X-ray emission and synchrotron produced X-ray fluorescence are also briefly discussed. DOE

N83-26665# Massachusetts Inst. of Tech., Cambridge. Lab. for Nuclear Reaction.
EFFECTS OF MULTI-ENERGY ION BOMBARDMENT, NEUTRON IRRADIATION, AND STRESS/TEMPERATURE CYCLING ON FATIGUE OF 316SS
G. Kohse and O. K. Harling May 1982 12 p refs Presented at the 5th Intern. Conf. on Plasma Surface, Gatlinburg, Tenn., 3 May 1982
(Contract DE-AC02-78ET-52027)
(DE82-016661; DOE/ET-52027/4; CONF-820545-11) Avail: NTIS HC A02/MF A01

Samples which had been subjected to high fluence helium and lithium ion bombardment with concurrent temperature cycling from 340 to 580 C were found to have a significantly higher post-irradiation fatigue life (for cycles to failure on the order of 10 to the 5th power) than non-ion-bombarded samples, provided that the maximum in stress cycling during irradiation does not exceed approximately half the yield stress. Although cycling to higher stresses during ion bombardment negates this increase, no detrimental effect on post-irradiation lifetime is found despite the presence of higher densities of short surface cracks. DOE

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

No abstracts in this category.

74 OPTICS

Includes light phenomena.

N83-26666*# Operations Research, Inc., Silver Spring, Md.
MULTISPECTRAL RESOURCE SAMPLER WORKSHOP Summary Report
1979 258 p Workshop held in Fort Collins, Colo., 31 May - 1 Jun. 1979
(Contract NAS5-25606)
(NASA-CR-170508; NAS 1.26:170508) Avail: NTIS HC A12/MF A01 CSCL 20F

The utility of the multispectral resource sampler (MRS) was examined by users in the following disciplines: agriculture, atmospheric studies, engineering, forestry, geology, hydrology/oceanography, land use, and rangelands/soils. Modifications to the sensor design were recommended and the desired types of products and number of scenes required per month were indicated. The history, design, capabilities, and limitations of the MRS are discussed as well as the multilinear spectral array technology which it uses. Designed for small area inventory, the MRS can provide increased temporal, spectral, and spatial resolution, facilitate polarization measurement and atmospheric correction, and test onboard data compression techniques. The advantages of using it along with the thematic mapper are considered. A.R.H.

N83-26667# Galileo Electro-Optics Corp., Sturbridge, Mass.
DESIGN AND DEVELOP A CONCENTRIC CORE OPTICAL FIBER Final Technical Report, 1 Aug. 1980 - 30 Sep. 1981
Henry J. Hoar, Jr. Hanscom AFB, Mass. RADC Nov. 1982 67 p
(Contract F19628-80-C-0200; AF Proj. 7820)
(AD-A123232; RADC-TR-82-88) Avail: NTIS HC A04/MF A01 CSCL 20/6

Concentric core optical fibers were developed for operation at 0.85 micron and 1.3 microns. The fibers were characterized for

cross-sectional geometry, numerical aperture, attenuation, crosstalk and dispersion. Author (GRA)

N83-26668# Hughes Research Labs., Malibu, Calif.
PHASE CONJUGATE OPTICS Interim Report, 16 Sep. 1980 - 16 Sep. 1981
G. J. Dunning, M. B. Klein, and R. C. Lind Hanscom AFB, Mass. RADC Nov. 1982 117 p refs
(Contract F19628-80-C-0185; AF Proj. 2306)
(AD-A123233; RADC-TR-82-288) Avail: NTIS HC A06/MF A01 CSCL 20/6

The purpose of this program is to study both theoretically and experimentally the use of phase conjugate optics for information processing and image transmission applications. The objectives are to analyze and develop phase conjugation techniques for optical signal processing, and to determine the usefulness of phase conjugation for restoring spatial information transmitted over multimode optical fibers, and to study real-time optical convolution and correlation of spatially modulated input waves. Author (GRA)

N83-26669# Naval Research Lab., Washington, D. C.
NUMERICAL STUDY OF PHASE CONJUGATION IN STIMULATED BRILLOUIN SCATTERING FROM AN OPTICAL WAVEGUIDE
R. H. Lehmberg 30 Dec. 1982 27 p refs
(AD-A123237; NRL-MR-4985) Avail: NTIS HC A03/MF A01 CSCL 20/6

Phase conjugation in stimulated Brillouin scattering (SBS) from an optical waveguide is studied numerically, using a Cartesian two dimensional propagation code (BOUNCE) that includes pump depletion. The simulations show that light scattered back through a phase aberrator produces a far field profile closely matching that of the incident beam; however, the near field intensity exhibits large and rapid spatial inhomogeneities across the entire aberrator, even for conjugation fidelities H as high as 98%. GRA

N83-26670# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A TIME INTEGRATING OPTICAL CORRELATOR FOR ADAPTIVE ARRAY PROCESSING M.S. Thesis
Linden Beattie Mercer Dec. 1982 89 p refs
(AD-A124672; AFIT/GEO/EE/82D-5) Avail: NTIS HC A05/MF A01 CSCL 20/6

Application of optical signal processing techniques to adaptive array processing was investigated. The common adaptive array algorithms were reviewed. Adaptive array processing generally requires some form of correlation and the characterisitics of optical correlators were compared leading to the selection of the time integrating optical correlator for further investigation. An adaptive array processor using time integrating optical correlators, which was first proposed by David Casasent, was analyzed to determine applicability of this signal processing technique to a general adaptive array environment. This processor was found to be similar to a comparable maximum likelihood approach. Limitations on the performance of this processor in terms of ambiguity and resolution were found and these results were confirmed by computer simulation of the adaptive array environment, the processor, and the resulting antenna response. Author (GRA)

N83-26671# Arizona Univ., Tucson. Optimal Sciences Center.
SCATTERING MEASUREMENTS OF RAYTRAN ZINC SELENIDE IN TRANSMISSION AT WAVELENGTHS OF 0.6328. 3.39, AND 10.6 MICROMETERS Final Report, Aug. 1979 - Apr. 1981
F. O. Bartell, A. G. DeBell, E. L. Dereniak, J. Hubbs, T. Stuhlinger, and W. L. Wolfe Watertown, Mass. AMMRC Aug. 1981 165 p refs
(Contract DAAG46-79-M-0871; DA Proj. 8X3-63304-D-215)
(AD-A124458; AMMRC-TR-81-38) Avail: NTIS HC A08/MF A01 CSCL 20/6

The transmission scattering of three samples of different thicknesses of zinc selenide were measured. The samples were 1/4 in., 3/4 in. and 1 in. thick. Fifty-four plots of the BTDF were made utilizing the scattering data obtained at 0.6328, 3.391, and 10.6 microns. Author (GRA)

N83-26672# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN EVALUATION OF THE EFFECTIVENESS OF DEPLOYING ELECTRO-OPTICAL TELESCOPES FOR SATELLITE TRACKING ON HIGH ALTITUDE POWERED PLATFORMS M.S. Thesis
Richard T. Salmon Dec. 1982 135 p refs
(AD-A124734; AFIT/GSO/OS/82D-4) Avail: NTIS HC A07/MF A01 CSCL 17/8

The purpose of this research was to evaluate the possible benefits of an air based system of electro-optical satellite tracking telescopes. A computerized simulation model was developed to conduct a comparative analysis of a hypothetical system of air based telescopes with the Ground-Based Electro-Optical Deep Space Surveillance (GEODSS) System. The simulation includes a first order optimization process for selecting a satellite surveillance system and a many-on-many engagement model to test the effectiveness of the surveillance system selected. In addition, the user can input a preselected surveillance system and test its effectiveness. The user specifies the characteristics of the surveillance system and the basing locations, if they are preselected. Cloud cover data can be entered with preselected ground sites. Target satellites included four sets of representative satellite systems. The user selects the targets, defines the mission time, and determines the percentage of each target system which must be tracked. Preliminary results indicate that an air based surveillance system with three dispersed telescope platforms could outperform a system of five candidate GEODSS sites.
Author (GRA)

N83-26673# Indiana Univ., Bloomington. Dept. of Chemistry.
NEAR INFRARED REFLECTANCE ANALYSIS BY GAUSS-JORDAN LINEAR ALGEBRA Interim Technical Report
D. E. Honigs, J. M. Freelin, and G. M. Hieftje 10 Feb. 1983 33 p refs
(Contract N00014-76-C-0838)
(AD-A124787; INDU/DC/GMH/TR-83-53) Avail: NTIS HC A03/MF A01 CSCL 12/1

Near-infrared reflectance analysis (NIRA) is an analytical technique that uses the near-infrared diffuse reflectance of a sample at several discrete wavelengths to predict the concentration of one or more of the chemical species in that sample. However, because near-infrared bands from solid samples are both abundant and broad, the reflectance at a given wavelength usually contains contributions from several sample components, requiring extensive calculations on overlapped bands. In the present study, these calculations have been performed using an approach similar to that employed in multi-component spectrophotometry, but with Gauss-Jordan linear algebra serving as the computational vehicle. Using this approach, correlations for percent protein in wheat flour and percent benzene in hydrocarbons have been obtained and are evaluated. The advantages of a linear-algebra approach over the common one employing stepwise regression are explored.
Author (GRA)

N83-26674# Rochester Univ., N. Y. Dept. of Physics and Astronomy.
INFLUENCE OF PARTIAL COHERENCE ON LIGHT TRANSMISSION AND ON IMAGE FORMATION Final Report, 19 Dec. 1979 - 18 Dec. 1982
Emil Wolf Dec. 1982 22 p
(Contract DAAG29-80-C-0020)
(AD-A124411; ARO-16814.25-PH) Avail: NTIS HC A02/MF A01 CSCL 20/6

This research was primarily concerned with the broad area of optical coherence theory, with special reference to the influence of partial coherence on light transmission. Some newly discovered effects relating to focussing, as well as correction of wave-front distortions by the technique of phase conjugation were also studied; these topics are of special relevance for the understanding of the

structure of images, especially those formed with laser light, and for adaptive optics. Author (GRA)

N83-26675# Illinois Univ., Urbana. Electromagnetics Lab.
PLANE-WAVE DIFFRACTION BY A WEDGE: A SPECTRAL DOMAIN APPROACH
A. CiArkowski and R. Mittra Nov. 1981 28 p refs
(Contracts N00014-81-K-81-9; N00014-79-C-0424)
(AD-A124031; UIEM-TR-81-9; UILU-ENG-81-2555; UILU-ENG-82-2233; R-967) Avail: NTIS HC A03/MF A01 CSCL 20/6

In this paper we investigate the canonical problem of plane wave diffraction by a wedge in the context of the spectral domain approach which exploits the relationship between the induced current on a scatterer and its far field. We show how the Sommerfeld solution to the wedge diffraction problem can be manipulated in a form which enables one to interpret the far scattered field as the Fourier transform of the physical optics current on the two faces of the wedge, augmented by the fringe current near the tip of the wedge. We also show that the uniform asymptotic expansion derived by Lee and Deschamps on the basis of the Lewis, Ahluwalia and Boersma ansatz can be rigorously obtained using the approach presented in this paper.
Author (GRA)

N83-26676# Massachusetts Univ., Amherst. Dept. of Computer and Information Science.
DETERMINING THE INSTANTANEOUS AXIS OF TRANSLATION FROM OPTIC FLOW GENERATED BY ARBITRARY SENSOR MOTION Interim Technical Report
J. H. Rieger and D. T. Lawton Jan. 1983 26 p refs
(Contract N00014-82-K-0464; Grant PHS-5-R01-NS14971-04)
(AD-A124091; COINS-TR-83-1) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper develops a simple and robust procedure for determining the instantaneous axis of translation from image sequences induced by unconstrained sensor motion. The procedure is based upon the fact that difference vectors at discontinuities in optic flow fields generated by sensor motion relative to a stationary environment are oriented along translational field lines. This is developed into a procedure consisting of three steps: (1) locally computing difference vectors from an optic flow field; (2) thresholding the difference vectors; and (3) minimizing the angles between the difference vector field and a set of radial field lines which correspond to a particular translational axis. This method does not require a priori knowledge about sensor motion or distances in the environment. The necessary environmental constraints are rigidity and sufficient variation in depth along visual directions to endow the flow field with discontinuities. The method has been successfully applied to noisy, sparse, and low resolution flow fields generated from real world image sequences. GRA

N83-26677# ITT Electro-Optical Products Div., Roanoke, Va. Defense-Space Group.
MANUFACTURING METHODS AND TECHNOLOGY PROGRAM FOR RUGGEDIZED TACTICAL FIBER OPTIC CABLE, REVISION Progress Report, Oct. 1981 - Mar. 1982
D. Taylor Fort Monmouth, N. J. Army Communications Research and Development Command Apr. 1982 120 p refs
(Contract DAAK80-79-C-0789)
(AD-A124086; CORADCOM-79-0789-8-Rev; PR-8) Avail: NTIS HC A06/MF A01 CSCL 20/6

This report covers the period from October 1981 through March 1982 of the manufacturing methods and technology program for ruggedized tactical fiber optic cable. The scope of this effort, as reported herein, includes the following tasks and achievements: (a) Low temperature impact study, (b) Complete fabrication and evaluation of confirmatory sample cables, and (c) Initiate low temperature fiber study. Author (GRA)

N83-26678# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
SWITCHABLE ZERO ORDER DIFFRACTION GRATINGS AS LIGHT VALVES Semiannual Report, 1 Jul. - 31 Dec. 1982
John Melngailis 29 Dec. 1982 6 p
(Contract N00014-82-K-0522)
(AD-A125326) Avail: NTIS HC A02/MF A01 CSCL 20/6

The goal of this project is to build a light valve based on a switchable zero order diffraction grating. The grating is made switchable by fabricating it on two facing surfaces and then displacing one surface with respect to the other by half of one period. One way of producing the displacement is to use the strong piezoelectric properties of polyvinylidene fluoride. An alternate scheme using electrostatic forces is also being investigated. GRA

N83-26679# California Univ., Livermore. Lawrence Livermore Lab.
FOREX: A FIBER-OPTICS DIAGNOSTIC SYSTEM FOR STUDY OF MATERIALS AT HIGH TEMPERATURES AND PRESSURES
D. E. Smith and F. Roeske Jul. 1982 8 p Presented at the 26th Tech. Symp. and Exhibition of the Intern. Soc. for Opt. Engr., San Diego, Calif., 21 Aug. 1982
(Contract W-7405-eng-48)
(DE82-019437; UCRL-87284; CONF-820822-8) Avail: NTIS HC A02/MF A01

Fiber Optics Radiation Experiment system (FOREX) designed for measuring material properties at high temperatures and pressures in an underground nuclear test was fielded. The system collects light from radiating materials and transmits it through several hundred meters of optical fibers to a recording station consisting of a streak camera with film readout. The use of fiber optics provides a faster time response than is presently obtained with equalized coaxial cables over comparable distances. Fibers also have significant cost and physical size advantages over coax cables. The streak camera achieves a much higher information density than an equivalent oscilloscope system, and it also serves as the light detector. The result is a relatively low cost in manpower, space, and materials. For this experiment, the streak camera had a 120 ns time window with a 1.2 ns time resolution. DOE

N83-26680# Brookhaven National Lab., Upton, N. Y.
BEAM LINE FOR EXPERIMENTS WITH COHERENT X-RAYS
M. R. Howells, J. Kirz, and S. Krinsky Dec. 1982 18 p refs
(Contract DE-AC02-76CH-00016)
(DE83-006686; BNL-32519) Avail: NTIS HC A02/MF A01

The advantages of coherent soft X-rays for three dimensional imaging of biological specimens are discussed, the X-ray source requirements are described, and the general design of the beam line and its optical system are given. DOE

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N83-26681# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
PLASMA ELECTRON NUMBER DENSITY AND ELECTRON-NEUTRAL COLLISION FREQUENCY FROM COMPLEX IMPEDANCE MEASUREMENTS M.S. Thesis
Thomas W. Hermanson Dec. 1982 88 p refs
(AD-A124790; AFIT/GEP/PH/82D-12) Avail: NTIS HC A05/MF A01 CSCL 20/9

The plasma within an RF driven inductive coil interacts with the electrical generation circuit providing feedback useful for control of bulk plasma parameters. An investigation, employing a tunable RF circuit, was made applying complex impedance measurements as a plasma diagnostic. Plasma-circuit effects are modeled as capacitive coupling to the driving inductor; the magnitude of the plasma model capacitance being proportional to a complex plasma permittivity. Associated impedance, when annulled by tuning, results in a real resistive load dependent upon plasma

characteristics. Impedance diagnostics avoid the use of traditional internal probes. Application of this technique to inductive reactors is found to be inferior to capacitive reactors. Author (GRA)

N83-26682# Miami Univ., Coral Gables, Fla. Dept. of Mathematics.
WAVE PROPAGATION-NONLINEAR BOUNDARY VALUE PROBLEMS Annual Report
R. A. Goldstein 25 Jan. 1982 7 p
(Contract N00014-78-C-0608)
(AD-A123916) Avail: NTIS HC A02/MF A01 CSCL 20/9

Work on a paper entitled Perturbed Bifurcation of Stationary Striations in a Contaminated, Non-Uniform Plasma is included. GRA

N83-26683# SRI International Corp., Menlo Park, Calif.
PHYSICAL CONSTANTS FOR MICROWAVE DISCHARGE Final Report, 17 Sep. 1981 - 16 Sep. 1982
S. A. Damron and G. August 16 Sep. 1982 35 p refs
(Contract N00019-81-C-0479)
(AD-A125055) Avail: NTIS HC A03/MF A01 CSCL 20/3

Physical characteristics of gas breakdown caused by high-powered microwaves were studied experimentally. Since conditions for initiating breakdown have been studied theoretically and experimentally, this study concentrated on characterizing the breakdown plasma. The characteristics measured were plasma size, strength of the pressure wave emanating from the discharge, and the ion current collected on an electrostatic probe inserted in the plasma. From these measurements it was possible to estimate the temperature of the plasma, the efficiency of the plasma as a microwave absorber, and the electron and ion densities in the plasma. The experiments were made at the SRI microwave facility, which uses a 250 kW X-band (9.375 GHz) transmitter for its microwave source. The microwave energy is focused into a vacuum vessel (a bell jar) using a horn feed and a parabolic reflector. In the vacuum vessel a reflecting plate serves both to focus the microwave energy above the plate and as a mount for instrumentation that measures the discharge region. Camera measurements of the discharge showed that the discharge regions formed in the antinodal regions above the reflecting plate and took the shape of small pancakes. The lowermost and largest discharge region was about 2 cm in diameter and 2 mm thick. It floated about 8.7 mm above the reflecting plate, so that its distance from midplasma to reflecting plate was 9.7 mm. This was slightly higher than the 8 mm calculated as the antinodal point of the 9.735 GHz wave. Author (GRA)

N83-26684# Los Alamos Scientific Lab., N. Mex.
IDENTIFICATION OF FUTURE ENGINEERING-DEVELOPMENT NEEDS OF ALTERNATIVE CONCEPTS FOR MAGNETIC-FUSION ENERGY
Robert A. Krakowski 1982 39 p refs Presented at the Future Eng. Dev. Needs for Magnetic Fusion Workshop, Washington, D.C., 3-4 Aug. 1982
(Contract W-7405-eng-36)
(DE82-019566; LA-UR-82-1973; CONF-820838-1) Avail: NTIS HC A03/MF A01

The future engineering needs of alternative fusion concepts (AFCs) are assessed relative to the similar needs of the Tokamak in order to emphasize differences in required technology with respect to the well documented mainline approach. Although nearly thirty AFCs can be identified as being associated with some level of reactor projection redirection, refocusing, and general similarities can be used to generate a reduced AFC list that includes only the bumpy tori, stellarators, reversed-field pinches, and compact toroids. Furthermore, each AFC has the potential of operating as a conventional (low power density, superconducting magnets) or a compact, high-power-density (HPD) system. Hence, in order to make tractable an otherwise difficult task, the future engineering needs for the AFCs are addressed for conventional versus compact approaches, with the latter being treated as a generic class and the former being composed of bumpy tori, stellarators, reversed-field pinches, and compact toroids. DOE

N83-26685# California Univ., Livermore. Lawrence Livermore Lab.
THE FUTURE ENGINEERING NEEDS OF MIRROR FUSION REACTORS
K. I. Thomassen 30 Jul. 1982 25 p refs Presented at the Workshop on the Identification of Future Eng. Dev. Needs for Magnetic Fusion, Washington, D.C., 3-4 Aug. 1982 Submitted for publication
(Contract W-7405-eng-48)
(DE82-019434; UCRL-87749; CONF-820838-2) Avail: NTIS HC A02/MF A01

The national Mirror Program Plan and available design studies of mirror projects are used to put the specific needs of the mirror program in perspective. Topics covered include the tandem mirror experiment, the mirror advanced reactor study, and the fusion power demonstration facility. DOE

N83-26686# California Univ., Los Angeles. Dept. of Physics.
EXPERIMENTAL INVESTIGATION OF TWO-DIMENSIONAL CRITICAL SURFACE STRUCTURE, STIMULATED RAMAN SCATTERING AND TWO-PLASMON DECAY INSTABILITY Annual Report, 1 Jan. 1981 - 30 Apr. 1982
Alfred Y. Wong, D. L. Eggleston, T. Tanikawa, and S. J. Qian Nov. 1982 35 p refs
(Contract DE-AS08-81DP-40136)
(DE83-006593; DOE/DP-40136/1) Avail: NTIS HC A03/MF A01

Experimental observations of the space and time evolution of resonantly enhanced electrostatic electric fields and plasma density in cylindrical geometry demonstrate the development of two dimensional caviton structure when an initial density perturbation is imposed on the plasma in the direction perpendicular to the driver field. This two dimensional structure is observed after the development of profile modification and grows on the ion time scale. The existence of a large azimuthal electric field component is an observational signature of two dimensional structure. Enhanced electric field maxima are found to be azimuthally correlated with the density minima. Both the density cavities and electric field peaks exhibit increased azimuthal location with the growth of two dimensional structure. The two dimensional development exhibits a strong dependence on both perturbation wavenumber and driver power. The related theoretical literature is reviewed and numerical, analytical, and qualitative hybrid models for a driven, two dimensional, inhomogeneous plasma are presented. DOE

N83-26687# Wisconsin Univ., Madison. Fusion Engineering Program.
VARIATIONAL CALCULATION OF THE TRAPPING RATE IN THERMAL BARRIERS
X. Z. Li and G. A. Emmert Oct. 1982 25 p refs
(DE83-006440; DOE/ET-52048/26) Avail: NTIS HC A02/MF A01

A variational calculation of the trapping rate and trapped ion density in thermal barriers is presented. The effects of diffusion in energy as well as pitch angle scattering are retained. The variational formulation uses the actual trapped-passing boundary in velocity space. The boundary condition is that the trapped ion distribution function matches the passing ion distribution function, which is taken to be a Maxwellian, on the boundary. The results compare well with two-dimensional Fokker-Planck code calculations by Futch and LoDestro. DOE

N83-26688# California Univ., Livermore. Lawrence Livermore Lab.
ACCELERATION OF MAGNETIZED PLASMA RINGS
D. Hartman, J. Eddleman, and J. H. Hammer 16 Nov. 1982 5 p refs Presented at 5th Symp. on Phys. and Technol. of Compact Toroids in the Magnetic Fusion Energy Program, Belevue, Wash., 16 Nov. 1982 Submitted for publication
(Contract W-7405-eng-48)
(DE83-006609; UCRL-87941; CONF-821124-15) Avail: NTIS HC A02/MF A01

One scheme is considered, acceleration of a ring between coaxial electrodes by a B/sub theta/ field as in a coaxial rail gun.

If the electrodes are conical, a ring accelerated towards the apex of the cone undergoes self similar compression (focussing) during acceleration. Because the allowable acceleration force F/sub a/ = kappa U/sub m//R (kappa < 1) increases as R(+2), the accelerating distance for conical electrodes is considerably shortened over that required for coaxial electrodes. In either case however, since the accelerating flux can expand as the ring moves, most of the accelerating field energy can be converted into kinetic energy of the ring leading to high efficiency. DOE

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N83-26689*# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemical Engineering.

HEAT, MASS AND MOMENTUM TRANSFER IN EDGE-DEFINED FILM-FED CRYSTAL GROWTH Ph.D. Thesis

Hisham M. Ettouney Mar. 1983 57 p refs Presented at the 72nd Ann. Meeting of the Am. Inst. of Chem. Eng., Chicago, Nov. 1980, the 2nd Workshop on the Processing of Electron. Mater., Brown Univ., Oct. 1980, the Spring Natl. Am. Inst. of Chem. Eng. Meeting, Orlando, Fla., Mar. 1982, and the 7th Intern. Conf. on Crystal Growth (ICCG-7), Stuttgart, Sep. 1983 Submitted for Publication Sponsored in part by NASA, Mobil Solar Corp., The Mobil Foundation, and Massachusetts Inst. of Tech.

(NASA-CR-170348; NAS 1.26:170348) Avail: NTIS HC A04/MF A01 CSCL 20L

Semi-crystalline silicon sheets which form the base for photovoltaic devices are being grown from the melt by meniscus-defined crystal growth techniques, where heat transfer in melt and solid and to the surroundings interact with the shape of the melt/gas interface to set the shape of the crystal. In the edge defined film fed growth technique (EFG) an inert die is used to control the extent of the melt and to help shape the melt and crystal. The tranport phenomena in the EFG system is mathematically analyzed so as to establish the operating limits for the process and the connections between the actual growth conditions and the quality of the crystal sheet as measured by its compositional uniformity and degree of crystalline perfection. Author

N83-26690# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

DEPTH-RESOLVED CATHODOLUMINESCENCE STUDY OF ANNEALED SILICON IMPLANTED GALLIUM ARSENIDE M.S. Thesis

Jeffrey Ray Cavins Dec. 1982 75 p refs

(AD-A124705; AFIT/GEP/PH/82D-2) Avail: NTIS HC A04/MF A01 CSCL 20/12

Depth-resolved cathodoluminescence was performed on Si ion implanted GaAs. The samples were Cr doped semi-insulating GaAs crystals grown using the horizontal Bridgman method. Nine samples were prepared for this study, four were implanted with 100 keV Si ions at a fluence of 10 to the 13th power/sq. cm, and five were left unimplanted. One each of the implanted and unimplanted samples were annealed at 800 C for 10 minutes, 800 C for 10 seconds, 900 C for 10 minutes, or 900 C for 10 seconds, for a total of eight samples. The ninth sample was left unannealed and unimplanted as a control. Cathodoluminescence data was taken using 1000 V electrons as an excitation source. Depth resolution was achieved by taking spectral data and successively chemically etching the surface of the crystal in 250 A steps. No new peaks were observed in the GaAs during the experiment. The 800 C/10 minute anneal proved to have the greatest effect in optically activating the impurities in the unimplanted samples. The 900 C/10 minute anneals exhibited spectra associated with vacancy complexes. GRA

N83-26691# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

A STUDY OF RECRYSTALLIZATION IN CADMIUM TELLURIDE M.S. Thesis

Richard Bratton Snoddy Dec. 1982 49 p refs

(AD-A124704; AFIT/GEP/PH/82D-21) Avail: NTIS HC A03/MF A01 CSCL 20/2

Solid state recrystallization of vapor grown polycrystalline cadmium telluride (CdTe) samples was studied using a zone heating method adapted from the LESS (Lateral Epitaxy by Seeded Solidification) technique developed by J.C.C. Fan, et al at Lincoln Laboratories for silicon films. These experiments were part of an effort to produce large, twin free, single crystals of CdTe suitable for the epitaxial growth of mercury cadmium telluride compounds. Extended, high temperature annealing of CdTe samples at 800 C and 2.5 atmospheres of nitrogen revealed no changes in the grain structure. Zone heating experiments were performed on CdTe wafers and films at 850 C. Sputtered gold films were used as encapsulating layers. The samples were heated in a vacuum or in argon at atmospheric pressure with zone rates of 1.3 and 0.75 mm/sec. No recrystallization was observed but preferential epitaxy of amorphous CdTe films onto the polycrystalline substrate was noted. GRA

N83-26692# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

ELECTRICAL PROPERTIES OF SILICON-IMPLANTED GaAs M.S. Thesis

Yong Yun Kim Dec. 1981 62 p refs

(AD-A124675; AFIT/GEP/PH/82D-17) Avail: NTIS HC A04/MF A01 CSCL 20/12

A comprehensive study of the electrical properties of low-dose Si implants in both Cr-doped and undoped GaAs substrates has been made using the Hall-effect/sheet-resistivity measurement technique for various ion doses, ion energies, and annealing temperatures. The samples were implanted at room temperature and annealed with silicon nitride encapsulants in a hydrogen atmosphere for 15 minutes. N-type layers were produced at all dose levels investigated, and the optimum annealing temperature was 850 C for all doses. The highest electrical activation efficiencies obtained were 89% and 87% for Cr-doped and undoped GaAs substrates, respectively. The electrical activations and mobilities of undoped GaAs are, in general, higher than those of Cr-doped GaAs at all annealing temperatures for a given dose. The electrical activations and mobilities also depend upon the ion energy increasing with ion energy. GRA

N83-26693# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

USING ARSINE (AsR3) AS A SOURCE OF ARSENIC IN MOLECULAR BEAM EPITAXY M.S. Thesis

Gregory C. Clark Dec. 1982 81 p refs

(AD-A124676; AFIT/GEP/PH/82D-5) Avail: NTIS HC A05/MF A01 CSCL 20/12

Recent research indicates that cracked arsine produces a better source of As than the conventional solid sources for the MBE growth of quality semiconductors. Further investigation into this topic was the problem of this thesis. A Varian 360 MBE system with conventional furnaces was modified for use with arsine. An arsine handling system and two different cracking furnaces using commercially available resources were constructed. The first furnace constructed was a bulbous design with internal baffles for insuring longer furnace dwell times for the arsine molecules. The second design used a helical quartz tube, approximately 20 inches long, inside a tantalum furnace. Several samples were grown using each cracking furnace. Preliminary results indicate an unsuspected cracking mechanism is responsible for earlier successes; perhaps the primary cracking mechanism is not pyrolytic but photolytic or catalytic. Author (GRA)

N83-26694# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

FAR-INFRARED PHOTOCONDUCTIVITY OF HIGH PURITY

N-GaAs IN A MAGNETIC FIELD USING RAPID-SCAN FOURIER TRANSFORM SPECTROSCOPY M.S. Thesis
David P. Svetz Dec. 1981 163 p refs
(AD-A124679; AFIT/GEE/PH/82D-22) Avail: NTIS HC A08/MF A01 CSCL 20/12

The donor impurities in high purity n-GaAs can be described using a hydrogenic model. In a magnetic field the hydrogenic donor levels will split and the chemical shifts of the 1s-2p Zeeman transitions between donor states can be used to identify the impurities. The 1s-2p (m = + or - 1) transitions are the strongest and best to use to identify the impurities. A rapid-scan Fourier transform spectrometer is used in conjunction with gold coated lightguide optics and a 125kG superconducting magnet to obtain photoconductivity spectra. The experimental arrangement and procedure are described in detail. This is the first known use of a rapid-scan Fourier transform spectrometer for this type of experiment. Zero field spectra from a sample with a carrier concentration of 1.25 x 10 to the 14th power/cc and liquid nitrogen mobility of 150,000 sq. cm/V-sec are presented and discussed along with the problems in setting up the experiment and obtaining spectra in a magnetic field. GRA

N83-26695# Stanford Univ., Calif.
ELASTIC DOMAIN WALL WAVES IN FERROELECTRIC CERAMICS AND SINGLE CRYSTALS Annual Progress Report, 1 Feb. 1982 - 31 Jan. 1983
B. A. Auld Feb. 1983 36 p refs
(Contract N00014-79-C-0222)
(AD-A124587; SU-GL-3544) Avail: NTIS HC A03/MF A01 CSCL 20/2

We have made measurements of the mode structure of bulk wave transducers in PZT-epoxy composites and developed a space harmonic theory of periodic composites that explains qualitatively some of the observed phenomena. Attenuation measurements have been made on PMN electrostrictor ceramic. A biased interdigital transducer has been designed and fabricated for surface acoustic wave excitation on PMN. Author (GRA)

N83-26696# Minnesota Univ., Minneapolis. Dept. of Electrical Engineering.
A STUDY OF FLICKER NOISE AND HOT ELECTRON NOISE IN JFETS, MOSFETS AND RELATED DEVICES Final Report, Mar. 1981 - Oct. 1982
A. vanderZiel 31 Jan. 1983 7 p refs
(Contract DAAG29-79-C-0078)
(AD-A124445; ARO-16441.21-EL) Avail: NTIS HC A02/MF A01 CSCL 09/1

1/f noise in unimplanted MOSFETs is also of the number fluctuations type. 1/f noise in JFETs is so small that it is almost unobservable. 1/f noise in buried channel MOSFETs is smaller than in diffused MOSFETs. Hot electron noise was observed in buried channel MOSFETs and in short channel JFETs. In the latter case it is masked by generation-combination noise due to partly ionized donors below 120 K. Low-frequency noise in GaAs current limiters is one dimensional diffusion noise governed by an activation energy that is voltage dependent. Modulation-doped GaAs FETs (HEMTs) have a sizeable amount of 1/f noise, probably of the number fluctuations type and thermal noise at higher frequencies. Short n(+)-n(-)-n(+) GaAs diodes have a linear characteristic, higher frequencies. The high-frequency behavior of short n(+)-n(-)-n(+)GaAs diodes and of short n(+)-n(-)-grid-n(-)-n(+) solid state diodes was estimated; picosecond electronics seems feasible. GRA

N83-26697# Illinois Univ., Urbana-Champaign. Coordinated Science Lab.
ION IMPLANTATION DEFECTS IN SILICON AND THE PERFORMANCE OF MICRON AND SUBMICRON DEVICES Final Report, 16 Jan. 1980 - 16 Jan. 1983
Ben G. Streetman and Karl Hess 31 Jan. 1983 29 p refs
(Contract DAAG29-80-C-0011)
(AD-A124497; ARO-16849.22-EL) Avail: NTIS HC A03/MF A01 CSCL 20/12

We report investigations of hot electron effects in heterojunction layers, studies of laser annealing and ion implantation, and a general study of electronic transport in small devices. GRA

N83-26698# Illinois Univ., Urbana. Coordinated Science Lab.
LASER ANNEALING OF ION IMPLANTED SILICON Ph.D. Thesis
Anjan Bhattacharyya Aug. 1981 99 p refs
(Contracts N00014-79-C-0424; DAAG29-80-C-0011)
(AD-A124465; R-912; UILU-ENG-81-2243) Avail: NTIS HC A05/MF A01 CSCL 20/12

We present here a detailed theoretical and experimental investigation of the dynamics of surface melting and regrowth and electrical activation of Si+ and BF(+2) ion implanted amorphized silicon annealed with a Q-switched Nd:glass laser (lambda = 1.06 microns). In the theoretical calculations we have used the technique of finite difference equations to solve the one-dimensional heat conduction equations for the solid and liquid phases. We have taken into account the temperature dependence of all the parameters involved to give us a realistic model. The melting model is supported by time resolved reflectivity measurements using a He-Ne and an Ar laser. We use SEM to investigate the electron channeling pattern to study the quality of crystalline regrowth. For BF(+2) implanted silicon, the boron and fluorine atomic profiles are measured by secondary ion mass spectrometry (SIMS) on as-implanted samples as well as laser annealed samples. The impurity redistribution is explained on the basis of the melting model. GRA

N83-26699# Illinois Univ., Urbana. Coodinated Science Lab.
SWEPT LINE ELECTRON BEAM ANNEALING OF ION IMPLANTED SEMICONDUCTORS
Kenneth James Soda Jul. 1982 132 p refs
(Contracts N00014-79-C-0424; DAAG29-80-C-0011)
(AD-A124428; R-950; UILU-ENG-82-2216) Avail: NTIS HC A07/MF A01 CSCL 20/12

The capabilities of a Swept Line Electron Beam (SLEB) in annealing ion-implanted semiconductors are examined. This technique employs a fixed geometry, line-shaped electron beam through which implanted samples are mechanically scanned. In general, this technique can produce annealing results comparable or superior to those achievable by conventional furnace annealing. Residual point defects in self-implanted amorphous silicon treated by SLEB and furnace processes are examined by Deep Level Transient Spectroscopy. GRA

N83-26700# Illinois Univ., Urbana. Coordinated Science Lab.
ANALYSIS OF ELECTRON TRAPS IN SILICON AND GALLIUM ARESENIDE BY DEEP-LEVEL TRANSIENT SPECTROSCOPY
Ruthanna Yusa Dejule Aug. 1982 48 p refs
(Contracts N00014-79-C-0424; DAAG29-80-C-0011)
(AD-A124422; R-957; UILU-ENG-82-2223) Avail: NTIS HC A03/MF A01 CSCL 20/12

Deep-level transient spectroscopy (DLTS) as a method for studying residual majority carrier trap concentrations in ion implant damaged silicon and galium arsenide is examined. Swept line electron beam (SLEB) annealing of silicon is shown to be more effective than thermal annealing in reduction residual damage and limiting background dopant redistribution. Finally, SLEB annealing of gallium arsenide is shown to produce thermal conversion as a result of rapid quenching during the annealing process. M.G.

N83-26701# Illinois Univ., Urbana. Coordinated Science Lab.
THE FABRICATION OF DOUBLE BETEROSTRUCTURE ALUMINUM GALLIUM ARSENIDE/GALLIUM ARESENIDE LASERS BY MOLECULAR BEAM EPITAXY
Timothy J. Drummond Jul. 1982 34 p refs
(Contract N00014-79-C-0424)
(AD-A124421; R-951; UILU-ENG-82-2217) Avail: NTIS HC A03/MF A01 CSCL 20/12

Today there exists a need to be able to process increasing amounts of data at rates beyond the capabilities of existing purely electrical networks. To meet this need, networks which transmit

data via an optical carrier rather than an electrical one are being developed. A necessary component of an optical network is a small, easily modulated source of coherent light. The only such source available is a laser diode. The first laser diode to operate continuously at room temperature was a double heterostructure (DH) (Al, Ga)As/GaAs laser prepared by liquid phase epitaxy (LPE). Much effort was subsequently devoted to reproducing those results by molecular beam epitaxy (MBE). MBE offers several advantages over LPE, such as control of composition and impurity profiles to atomic dimensions. Layers cna be grown on larger substrates and with a high degree of uniformity and reproducibility that is not possible with LPE. Despite these advantages, it was six years after the first continuous room temperature operation of an (Al, Ga)As/GaAs DH laser that a similar laser prepared by MBE was reported. The first MBE lasers typically had threshold current densities, Jth, about twice as large as similarly designed LPE lasers. Another three years passed before the art of MBE advanced to the point where it became possible to achieve laser performance equal to the LPE lasers. The presence of non-radiative recombination centers in the bulk (Al,Ga)As layers was shown to make a significant contribution to the high threshold current densities in MBE lasers. GRA

N83-26702# Rockwell International Corp., Thousand Oaks, Calif. Electronic Research Center.
EFFECTS OF SURFACE CONDITIONS ON CARRIER TRANSPORT IN 3-4 COMPOUNDS Interim Report, 1 Sep. 1979 - 1 Mar. 1980
S. P. Kowalczyk, J. R. Waldrop, R. W. Grant, and W. A. Hill Wright-Patterson AFB, Ohio AFWAL Aug. 1980 24 p refs
(Contract F33615-78-C-1532; AF Proj. 2306)
(AD-A124764; AFWAL-TR-80-1129; ERC41012.67IP; IR-3) Avail: NTIS HC A02/MF A01 CSCL 07/4

XPS (X-ray photoemission spectroscopy) measurements of surface chemistry and potential on vapor phase epitaxially grown n-type GaAs(100) and p-type bulk GaAs material are reported. Comparison of surface chemistry and potential is presented for bulk n- and p-type GaAs(100) samples. The assembly of several initial components of the contactless C-V apparatus is also described. Author (GRA)

N83-26703# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
PHOTOLUMINESCENCE STUDY OF N-TYPE THERMAL CONVERSION IN SEMI-INSULATING GaAs M.S. Thesis
John A. Guillen Dec. 1982 77 p refs
(AD-A124772; AFIT/GEO/PH/82D-3) Avail: NTIS HC A05/MF A01 CSCL 20/12

Chromium doped SI GaAs samples annealed at temperatures from 650 C to 950 C were examined for n-type thermal conversion. From Van der Pauw Hall measurements, it was determined that the samples annealed at 850, 900 and 950 C thermally converted. These converted samples were then subjected to resistivity profile measurements to determine the extent of the thermally converted layer. Depth resolved photoluminescence was also used to observe changes in the spectra as surface layers from the converted samples were removed. Although changes in the spectra were observed, none could be related to thermal conversion. Author (GRA)

N83-26704# California Inst. of Tech., Pasadena.
DETERMINATION OF THE MICROSCOPIC STRUCTURE OF SURFACE AND OVERLAYERS, ADSORBATE-ADSORBATE INTERACTION ENERGIES AND RATES OF SURFACE PROCESSES Final Report, 25 Sep. 1979 - 24 Sep. 1982
W. Henry Weinberg 28 Dec. 1982 22 p refs
(Contract DAAG29-79-C-0132)
(AD-A124418; P-13120-C/P-16273-C; ARO-16273.6-CH) Avail: NTIS HC A02/MF A01 CSCL 20/2

Progress has occurred in three major areas. First, work has continued in the general area of surface crystallography making use of low-energy electron diffraction. Second, a supersonic nozzle ultrahigh vacuum molecular beam surface scattering machine has been designed and constructed. This extremely versatile instrument allows precise measurement of a wide variety of surface phemonena including the elementary steps in gas-solid chemical reactions. Finally, a high pressure microreactor has been designed and constructed. This microreactor will be a useful adjunct to the molecular beam machine since in the former overall reaction kinetics will be measured under realistic pressure conditions, whereas in the latter elementary reaction rates will be measured under conditions of low pressure. Each of these three projects is described in detail below. GRA

N83-26705# Harvard Univ., Cambridge, Mass. Div. of Applied Sciences.
DEFECTS IN AMORPHOUS METALS Interim Technical Report
Frans Spaepen Jul. 1982 45 p refs
(Contract N00014-77-C-0002; NR Proj. 039-136)
(AD-A123897; TR-16) Avail: NTIS HC A03/MF A01 CSCL 20/12

Amorphous metals is a general term that refers to a class of solid metallic materials whose diffraction pattern shows no sharp reflections. When they are formed continuously from a melt by rapid quenching (usually around 1,000,000 K/s -1) they can be called metallic glasses. They can also be prepared by vapor, sputter, or electro-deposition, or even by ion-bombardment. Where the same metallic alloy has been prepared in amorphous form both by rapid quenching and by one of the other deposition techniques, the structure and many of the properties turn out to be rather insensitive to the method preparation. Author (GRA)

N83-26706# Amorphous Materials, Inc., Garland, Tex.
LARGE PLATE CdTe SYNTHESIS BY SEALED VESSEL TRANSPORT Quarterly Technical Report, 1 Sep. - 31 Dec. 1982
A. R. Hilton Jan. 1983 46 p refs
(Contract MDA903-82-C-0159; ARPA Order 4383)
(AD-A124035; AM-010; QTR-4) Avail: NTIS HC A03/MF A01 CSCL 20/12

Previously, in Technical Report 3, the decision to change to a vapor-melt process involving a three chambered system was reported. Results of 10 attempts to grow 6-in. plates from Stoichiometric melts are reported. In all cases, a void region occurs between the faces of the plate. To solve this problem, solution growth was selected over stoichiometric growth. A solid whole grain structure was obtained. The method was applied to growth of 8-in. plates but some difficulty was experienced. Analytical results of material grown in the vapor-melt process have demonstrated purity improvement. The AMTIR approach as applied promises to meet all program goals. Continuation of the effort to grow 8-in. and 10-in. diameter plates is recommended. GRA

N83-26707# Air Force Systems Command, Wright-Patterson AFB, Ohio.
SOME PROPERTIES OF MIXED OXIDE LAYERS HAVING AMORPHOUS STRUCTURES
S. A. Hogarth and L. A. Wright 4 Nov. 1982 16 p refs Transl. into ENGLISH from proceedings of the 9th Intern. Conf. on the Phys. of Semiconductors (USSR), v. 2, 1968 p 1352-1356 Conf. held in USSR, 1968
(AD-A124060; FTD-ID(RS)T-1390-82) Avail: NTIS HC A02/MF A01 CSCL 20/12

The properties of thin films prepared by simultaneously depositing the oxide component of the glass were studied. This required careful control of the rate of vaporization from each source. Layers of aluminum were also deposited to serve as electrodes in measuring the electrical and dielectric properties of the film. Optical properties were measured by conventional methods. The configuration of the vapor system used to obtain uniform film thickness and composition is shown. Properties are described for the following layers: SiO2/B2O3; SiO/B2O3, SiO/As2O5, SiO/BaO, and SiO/TiO. A.R.H.

N83-26708# Illinois Univ., Urbana. Coordinated Science Lab.
THEORETICAL STUDIES OF HIGH FIELD TRANSPORT IN

3-4 SEMICONDUCTORS Ph.D. Thesis
Hisashi Shichijo Sep. 1980 175 p refs
(Contracts N00014-79-C-0424; N00014-79-C-0768)
(AD-A123947; UILU-ENG-80-2225; R-893) Avail: NTIS HC A08/MF A01 CSCL 20/12

Two theoretical aspects of high field transport in III-V semiconductors have been studied. First, a new mechanism to obtain negative differential resistance in a GaAs-AlGaAs multilayered structure is described. The mechanism is based on the transfer of electrons in real space from a high mobility GaAs region to an adjacent low mobility AlGaAs region when a high electric field is applied parallel to the interface. It is analogous in many respects to the Gunn effect, except that this mechanism allows greater control of device characteristics. These characteristics can be adjusted by varying the doping densities, the layer thicknesses, and the Al mode fraction in the AlGaAs. The mechanism is analyzed using the electron temperature model and the Monte Carlo simulation. The electron temperature model is exact in the high carrier density limit, whereas the Monte Carlo method is valid in the low density limit. Both methods clearly illustrate the degree of control possible with this mechanism over device characteristics. Comparisons are made between the two models. Miscellaneous effects which are neglected in the models are discussed. These include two-dimensional effects, band bending, statistical fluctuation, and quantum mechanical transmission at the interface. GRA

N83-26709# Illinois Univ., Urbana. Coordinated Science Lab.
STUDIES OF ELECTRON TRAPS IN GALLIUM ARSENIDE AND GALLIUM ARSENIDE PHOSPHIDE BY DEEP LEVEL TRANSIENT SPECTROSCOPY Ph.D. Thesis
Ding-Yuan Samuel Day Mar. 1980 160 p refs
(Contracts N00014-79-C-0424; N00014-76-C-0806)
(AD-A124006; UILU-ENG-80-2209; R-877) Avail: NTIS HC A08/MF A01 CSCL 20/12

System effects and data analysis for deep level transient spectroscopy (DLTS) have been examined and applied to study the deel levels in the GaAs-GaP system. Studies of typical DLTS systems using either the lock-in amplifier or the dual-channel boxcar averager are presented. The effects of non-zero gate width for the boxcar averager, phase angle adjustment for the lock-in amplifier, and response time of a typical commercial capacitance meter are investigated. Errors introduced in the measurements by these effects are calculated for typical cases. Measurements of gold level in silicon are presented, along with calculated corrections. We find the correction to be minimal in the boxcar-averager method, but significant in the lock-in amplifier approach. A DLTS system is described for measuring deep levels in diodes exhibiting large leakage currents. A capacitance bridge is used employing the diode to be tested along with a dummy diode of similar characteristics. The DLTS spectrum of a leaky GaAs planar diode is measured and compared to experimental results obtained with two standard DLTS systems . It is shown that measurements with the standard systems are impossible in certain temperature ranges because of overloading problems. The approach described here, however, gives the DLTS spectrum between 77 K and 300 K. GRA

N83-26710# Harry Diamond Labs., Adelphi, Md.
OSCILLATOR STRENGTHS FOR THE VIBRATIONAL INDUCED ELECTRIC-DIPOLE TRANSITIONS IN Cs2NaRCl6
Clyde A. Morrison and Frank J. Crowne Dec. 1982 34 p refs
(DA Proj. 1L1-61102-A-31B)
(AD-A123997; HDL-TR-2000) Avail: NTIS HC A03/MF A01 CSCL 20/12

The vibrational modes of the elpasolite structure CsZNaRCl6 are discussed in detail. The interaction potential of the rare earth ion substituted at the R site is developed for multipolar charge distribution on the ligand (c) site. The theory is used to calculate the vibronic transition intensity for the Nu 6(87/cm) made for Er in CsZNaErCl6. The results indicate that the strength of the vibronic transition is approximately the same as the strength of the magnetic dipole transition. The vibronic line strength for transitions to the other multiplets was, in general, less than the corresponding magnetic dipole transitions. GRA

N83-26711# Illinois Univ., Urbana. Dept. of Ceramic Engineering.
DENSIFICATION OF PRECIPITATED YTTRIA STABILIZED ZIRCONIA (YSZ) TO ACHIEVE TRANSLUCENT PROPERTIES Interim Research Report, Oct. 1980 - Sep. 1982
R. C. Buchanan and D. M. Wilson 30 Nov. 1982 24 p refs
(Contract N00014-80-K-0969; Grant NSF DMR-80-20250)
(AD-A124042; TR-7) Avail: NTIS HC A02/MF A01 CSCL 20/2

Precipitated yttria (8.0 wt%) stabilized zirconia powders (YSZ) were sintered in the range 1150 degrees C-1350 degrees C using Al2O3 and B2O3 additions. A (2:1) Al2O3:B2O3 additive mixture at approximately 2 vol % concentration, gave highest densities when sintered at 1200 degrees C/1 hr. Washing of the powders to remove residual C1 was necessary to achieve high densification below 1300 degrees C. Samples obtained were optically translucent at 1 mm thickness with average grain size 0.2-0.4 microns. Pore size increased with sintering temperature but numbers were significantly reduced. Densification by liquid phase sintering was evident with B2O3 present, but mechanisms for Al2O3 additions were not clearly established. Author (GRA)

N83-26712# Wisconsin Univ., Madison. Dept. of Metallurgical and Mineral Engineering.
DIFFRACTION FROM OVERLAYER ISLANDS WITH POSITIONAL CORRELATION
T.-M. Lu, L.-H. Zhao, M. G. Lagally, G.-C. Wang (ORNL), and J. E. Houston (Sandia National Lab., Albuquerque) 20 Jan. 1983 25 p refs Submitted for publication
(Contract N00014-81-K-0718)
(AD-A124038; TR-5) Avail: NTIS HC A02/MF A01 CSCL 20/2

By presenting the autocorrelation functions with a set of delta-functions in the method developed by Houston and Park, closed-form solutions are obtained for the angular distribution of diffracted intensity, in the kinematic approximation, from commensurately adsorbed overlayer islands with positional correlation. It is shown, for islands with unit mesh larger than that of the substrate, that the interference between the islands has only a minor influence on the angular distribution of the superlattice beam intensity if the islands have short-range correlations in their position. Although interference effects are present in the line shape for islands with long-range positional correlation, it is shown that these are not measurable unless a very narrow detector is used. The results are applicable to LEED, RHEED, and grazing-angle X-ray diffraction measurements. GRA

N83-26713# Rockwell International Corp., Thousand Oaks, Calif. Science Center.
GROWTH OF HgCdTe BY MODIFIED MOLECULAR BEAM EPITAXY Semiannual Technical Report, 1 Mar. - 31 Aug. 1982
J. T. Cheung and H. Sankur 3 Jan. 1983 40 p refs
(Contract MDA903-79-C-0188; DARPA Order 3704)
(AD-A124057; SC5202.20SA; SATR-6) Avail: NTIS HC A03/MF A01 CSCL 20/12

The LADA Technique has been used to grow thin films of HgCdTe, CdTe, and ZnO films on various substrates. Single crystalline Hg(0.7)Cd(0.3)Te films of up to 15 microns thick were deposited on (111) CdTe substrates. Their electrical properties can be improved or altered by post-annealing in Hg over pressure. After annealing at 410 C, the films were successfully converted to p-type. Ion implanted n(+)/p photodiodes were demonstrated. Heteroepitaxial layers of (111) CdTe with excellent surface morphology were grown on (100) GaAs substrates. Near the interface region, there is a high density of misfit dislocations. However, the crystalline quality improves abruptly at approximately 2 microns from the interface. Dislocation density was determined by TEM analysis. At 6 microns from the interface, it is as low as 100,000/sq cm. ZnO films were dposited on a large variety of substrates. The growth condition and mechanism were studied in detail as the function of substrate temperature, ambient condition, annealing condition, and doping. Films with good uniformity and smooth morphology were obtained. They are

uniaxially oriented in the (0002) direction and have very high resistivity. Author (GRA)

N83-26714# Rockwell International Corp., Thousand Oaks, Calif. Science Center.
STUDIES OF THE ELECTRO-OPTIC EFFECT Final Report, 1 Jun. 1981 - 30 Sep. 1982
Mark D. Ewbank and Paul R. Newman Jan. 1983 80 p refs
(Contract N00014-80-C-0498; NR Proj. 372-909)
(AD-A123855; SC5266.2FR) Avail: NTIS HC A05/MF A01 CSCL 20/2

A microscopic understanding of the electro-optic effect in crystalline solids has been pursued by employing a tight-binding theory for dielectric susceptibilities. The electronic and lattice contributions to the second-order electro-optic susceptibility have been treated separately and the lattice response of a crystal to an external dc electric field has been investigated in a general formalism. The theory has been specifically applied to the compound, tellurium dioxide. In addition, an experimental determination of the electro-optic coefficient, re, in thallium arsenic selenide has been made. Author (GRA)

N83-26715# Harvard Univ., Cambridge, Mass. Division of Applied Sciences.
IDEAL ELASTIC, ANELASTIC AND VISCOELASTIC FLOW IN A METALLIC GLASS Interim Report
A. I. Taub and F. Spaepen Jul. 1982 10 p refs
(Contract N00014-77-C-0002)
(AD-A123893; TR-15) Avail: NTIS HC A02/MF A01 CSCL 20/12

The elastic, viscoelastic, and anelastic components of the homogeneous strain response of the metallic glass Pd82 Si18 to an applied stress have been examined. The elastic response is fully reversible, instantaneous, and linear. The measured elastic modulus and temperature dependence are E = 84 + or - 8 GPa and d(ln E) /dt = (-3.2 + or - 0.6) x 104/C. This viscoelastic flow is nonrecoverable, and, if the configuration remains constant, is characterized by a constant strain rate. This strain rate varies linearly with the stress in the low stress regime (tau <300 MPa), becoming nonlinear for higher stresses. For isoconfigurational flow, the strain rate has an Arrhenius-type temperatures dependence with an activation energy of -200 + or - 15 kJ/mole, independent of stress and thermal history. The magnitude of the strain rate is strongly dependent on the degree of structural relaxation and therefore on thermal history. During isothermal annealing, the viscoelastic strain rate varies inversely with time. The anelastic response is a transient that at 500 K contributes to the flow for approximately 50 hours after a stress increase and is fully recovered upon stress reduction. A spectrum of exponential decays is required to model this flow component. The anelastic strain varies linearly with the magnitude of the stress change over the entire stress range tested. GRA

N83-26716# Hughes Research Labs., Malibu, Calif.
DEVELOPMENT OF A SILICON LIQUID-CRYSTAL LIGHT VALVE FOR MULTIMODE OPERATION Final Report, 1 Jan. 1978 - 28 Feb. 1982
U. Efron, E. Weiner-Avnear, J. Grinberg, P. O. Braatz, M. J. Little, and R. N. Schwartz Jul. 1982 86 p refs
(Contract N00024-76-C-5366)
(AD-A123887) Avail: NTIS HC A05/MF A01 CSCL 20/12

The aim of this program has been to develop the silicon photoconductor liquid crystal light valve (LCLV) as a second-generation, higher-performance device, as well as to optimize the multimode operation of the liquid crystal. The latter effort was primarily aimed at allowing a full-performance CdS LCLV to be realized, given the switching-ratio limitation of this device, as well as to allow the silicon LCLV, when completed, to fully benefit from this development. This program has resulted in the successful development of a silicon LCLV in which we have solved the edge breakdown effect, developed a novel Si/SiO2 dielectric mirror, implemented a focusing-grid to improve resolution and scaled up the device from a 1 cm x 1 cm aperture to a 2 in. aperture device. This has resulted in a fast-response, high switching-ratio device approaching the resolution performance of the CdS light valve. The LC multimode operation has been successfully optimized, resulting in a practical demonstration of a back-slope-type operation applicable to the switching-ratio-limited CdS devices. Results of the theoretical model developed for the liquid crystal operation were in good agreement with experimental measurements. GRA

N83-26717# Raytheon Co., Lexington, Mass.
FABRICATION STUDIES OF TERNARY RARE EARTH SULFIDES FOR INFRARED APPLICATIONS Final Technical Report, 1 Jun. 1980 - 31 Dec. 1981
Kenneth J. Saunders and Richard L. Gentilman May 1982 21 p refs
(Contract N00014-80-C-0430)
(AD-A123921; S-3061) Avail: NTIS HC A02/MF A01 CSCL 17/5

A process has been developed for fabricating transparent CaLa2S4. The key aspect of the process is the synthesis of essentially phase pure CaLa2S4 powder. This powder is readily sinterable to 95-98 percent density and can subsequently be made transparent by hot isostatic pressing. In-line transmittances of 50, 54, and 56 percent were achieved at 5,10, and 16 microns for 0.3 mm sample thickness. Absorption coefficients as low as 9/cm at 12 microns were measured. GRA

N83-26718# Rockwell International Corp., Thousand Oaks, Calif. Microelectronics Research and Development Center.
LSI/VLSI ION IMPLANTED GaAs IC PROCESSING Quarterly Technical Report, 1 Nov. 1981 - 31 Jan. 1982
Ricardo Zucca, Y. D. Shen, P. Asbeck, C. G. Kirkpatrick, and A. Firstenberg Dec. 1982 39 p refs
(Contract F49620-80-C-0101; ARPA Order 3384; AF Proj. 3384)
(AD-A125014; AFOSR-83-0039TR; MRDC41070.18QR; QR-6)
Avail: NTIS HC A03/MF A01 CSCL 09/5

This report covers the sixth quarter of a program aimed at fully realizing the potential of GaAs for digital integrated circuits employing depletion mode MESFETs. During this reporting period, large single crystals of GaAs have been grown by the Bridgman technique of Crystal Specialties. In the area of processing, a study was made of the dependence of threshold voltage on the post-implantation anneal time. This study indicates that the anneal time used in the IC process is adequate. LSI yield test structures consisting of long parallel meander lines were used to evaluate various options for metal depositions. Magnetron sputtering was the preferred technique. The yield of long chains of interconnects was also evaluated. The 8 x 8 multiplier circuit implemented with SD2FL gates was tested. Work continued on MESFET modeling. The effects of shortening source-drain gap were evaluated.
Author (GRA)

N83-26719# Hughes Research Labs., Malibu, Calif.
BASIC PROBLEMS IN InP TECHNOLOGY Final Report, 28 Feb. 1981 - 27 Feb. 1982
K. V. Vaidyanathan and H. L. Dunlap Nov. 1982 59 p
(Contract F49620-81-C-0037; AF Proj. 2306)
(AD-A125181; AFOSR-82-1100TR) Avail: NTIS HC A04/MF A01 CSCL 20/12

Procedures for evaluating the thermal stability of semi-insulating InP have been developed. The determination of the concentration of iron in S.I. InP and the migration of Fe during high temperature processing have been identified as a major problem. The effectiveness of plasma deposited Si3N4 and chemical vapor deposited phosphosilicate glass (PSG) as annealing encapsulants have been evaluated. PSG appears to be the encapsulant of choice at the moment. GRA

N83-26720# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
ELECTRON PARAMAGNETIC RESONANCE AT DISLOCATIONS IN GERMANIUM Ph.D. Thesis
Elga Jekobsons Pakulis Jun. 1982 93 p refs

(Contract DE-AC03-76SF-00098)
(DE82-020070; LBL-14664) Avail: NTIS HC A05/MF A01

The first observation of the paramagnetic resonance of electrons at dislocations in germanium single crystals is reported. Under subband gap optical excitation, two sets of lines are detected: four lines about the <111> axes with g/sub perpendicular to/ = 0.34 and g/sub parallel/ = 1.94, and 24 lines with g/sub perpendicular to/ = 0.73 and g/sub parallel/ = 1.89 <111> axes with the six fold 1.2 deg distortion. This represents the first measurement of the distortion angle of a dislocation dangling bond. The possibility that the distortion results from a Peierls transition along the dislocation line is discussed. DOE

N83-26721# Illinois Univ., Urbana. Dept. of Ceramic Engineering.
POLARIZATION REVERSAL AND ELECTROCALORIC MEASUREMENTS FOR FIELD-ENFORCED TRANSITIONS IN THE SYSTEM LEAD ZIRCONATE-LEAD TITANATE-LEAD OXIDE: TIN OXIDE Ph.D. Thesis
Bruce Andrew Tuttle 1982 244 p refs
(Contract DE-AC02-78ER-04679)
(DE82-019095; DOE/ER-04679/T1) Avail: NTIS HC A11/MF A01

The Pb(Zr, Sn, Ti)O3 crystalline solution series (PZST) has several phases of near equal free energy, allowing field-enforceable antiferroelectric (AFE) to ferroelectric (FE) and paraelectric (PE) to ferroelectric (FE) transitions. An understanding of the stability of FE, AFE, and PE phases with respect to chemical composition, electric field and temperature was developed from low frequency polarization vs electric field measurements at different temperatures. All materials studied had a sequence of phase transitions FEAFE-PE with increasing temperature. The temperature range of AFE phase stability increased with increasing Zr/Ti ratio, while SnO2 content increased the stability over a wider compositional range. Thus, through compositional modification, some materials were fabricated that had an AFE temperature range of stability of only 3 C, while for others the temperature range of AFE phase stability was in excess of 100 C. DOE

N83-26722# Cornell Univ., Ithaca, N. Y.
MIGRATION OF GRAIN BOUNDARIES IN CERAMIC MATERIALS WITH PARTICULAR REFERENCE TO THE SINTERING PROCESS Technical Progress Report, 15 Jul. 1982 - 14 May 1983
C. B. Carter Jan. 1983 20 p refs
(Contract DE-AC02-82ER-12076)
(DE83-005262; DOE/ER-12076/1) Avail: NTIS HC A02/MF A01

Transmission electron microscopy studies of faceted interfaces in Al2O3 and Mg-Al spinel are reported. Migration of grain boundaries in Si, Ge, and Al2O3 are included. DOE

N83-26723# Stanford Linear Accelerator Center, Calif.
OPTICAL PUMPING AND PHOTOLUMINESCENCE DETECTION OF SPIN-POLARIZED ELECTRONS IN UNIAXIALLY STRESSED GALLIUM ARSENIDE
Paul Zorabedian 1982 120 p refs Sponsored by DOE
(DE82-012425; SU-SLAC-248) Avail: NTIS HC A06/MF A01

The development and application of an optical pumping and photoluminescence experiment for electron spin polarization measurements on semiconductor photocathode materials are described. The spin polarization increase that is produced by applying a uniaxial compression to a gallium arsenide crystal and selectivity optically pumping the transition between the upper strain-split valence band and the conduction band is discussed. The electron spin polarization is measured by analyzing the circular polarization of the photoluminescence. DOE

N83-26724# Ames Lab., Iowa.
TERNARY PHASES: SUPERCONDUCTIVITY MAGNETISM AND CRYSTALLOGRAPHIC STABILITY
R. N. Shelton 1982 9 p refs Presented at the 4th Conf. on Superconductivity in d- and f-band Metals, Karlsruhe, West Germany, 26-30 May 1982
(Contract W-7405-eng-82)
(DE82-019123; IS-M-397; CONF-820111-1) Avail: NTIS HC A02/MF A01

The rapid increase in the discovery of high transition temperature ternary superconducting systems is documented and reviewed in an attempt to discern any systematic, uniform behavior among the various ternary compounds. These superconducting compounds are often comprised of two metallic elements and one non-metal. This non-metallic element has attracted increasing attention due to the diversity of suitable elements (B, C, Si, Ge, P, O, S, Se) and its important role in forming a basic crystallographic framework. The third element in these compounds may be used to tune the electronic properties. In many instances, this third element is magnetic in nature and its presence in this metal/non-metal network may lead to long range magnetic order. Those phases that manifest this interplay between magnetism and superconductivity are emphasized. DOE

N83-26725# Ames Lab., Iowa.
TEMPERATURE DEPENDENCE OF THE FIELD INDUCED MAGNETIC FORM FACTOR OF THE INTERMEDIATE VALENCE COMPOUND CePd SUB 3
C. Stassis, C. K. Loong, J. Zarestky, O. D. McMasters, R. M. Moon, and J. R. Thompson 1982 7 p refs Presented at the 3rd Joint Intermag-Magnetism and Magnetic Mater. Conf., Montreal, Canada, 20-23 Jul. 1982 Prepared in cooperation with ORNL
(Contract W-7405-eng-82)
(DE82-019305; IS-M-387; CONF-820727-2) Avail: NTIS HC A02/MF A01

Polarized neutron scattering techniques have been used to obtain information regarding the ground-state electronic properties of the intermediate-valence compound CePd3. The spatial distribution of the magnetization induced by a magnetic field of 42.5 kG in a single crystal of CePd3 has been studied at 100 and 4.2 K. We find that at 100 K the measured form factor is in good agreement with the free-ion 4f magnetic form factor of Ce3+. At 4.2 K on the other hand, deviations from a 4f magnetic form factor were observed. An adequate fit to the experimental data taken at 4.2 K can be obtained by assuming that the induced magnetization contains a significant component of Ce-5d electronic character. DOE

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N83-26726# Manlabs, Inc., Cambridge, Mass.
COMPUTER BASED METHODS FOR THERMODYNAMIC ANALYSIS OF MATERIALS PROCESSING Annual Report, 1 Oct. 1981 - 30 Sep. 1982
Larry Kaufman and John Agren 2 Nov. 1982 56 p refs
(Contract F49620-80-C-0020; AF Proj. 2306)
(AD-A125277; AFOSR-83-1094TR) Avail: NTIS HC A04/MF A01 CSCL 09/2

A data base is being developed for calculating binary, ternary and multi component phase diagrams for systems of interest in processing novel materials. Current applications cover Zirconium Fluoride based Glasses for tunable gap Electro-Optical applications, Iron-Aluminum based alloys for high temperature applications and titanium-carbo-nitride compounds for hard metal coatings. Author (GRA)

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N83-26727# RAND Corp., Santa Monica, Calif.
POLICY ANALYSIS OF WATER MANAGEMENT FOR THE NETHERLANDS. VOLUME 5: DESIGN OF MANAGERIAL STRATEGIES
J. H. Bigelow May 1982 380 p refs Sponsored by the Netherlands Rijkswaterstaat
(N-1500/5-NETH) Avail: NTIS HC A17/MF A01

The water management infrastructure, water management and environmental quality, salt pollution, water management and thermal pollution, agricultural water use, shipping losses due to low water flows, mathematical analysis, and managerial strategies are considered. N.W.

N83-26728# CONCAWE, Hague (Netherlands).
METHODOLOGIES FOR HAZARD ANALYSIS AND RISK ASSESSMENT IN THE PETROLEUM REFINING AND STORAGE INDUSTRY
S. Hope, E. N. Bjordal, H. M. Diack, B. W. Eddershaw, and L. Joanny 1982 96 p
(PB83-146084; CONCAWE-10/82) Avail: NTIS HC A05/MF A01 CSCL 05A

The report provides readers both within and outside the petroleum industry with an overview of the methodologies already in use or being developed, to assist and supplement risk management practices. The report briefly describes the consecutive steps in the identification, assessment and comparison of hazards and associated risk. These techniques can be helpful in setting the priorities for the decision on measures to reduce risk. When quantifying risk e.g., for the comparison of alternative design cases, the use of a consistent data base is stressed. It is pointed out that the risk assessment techniques described in the report, although potentially valuable tools for improving overall safety performance, have shortcomings particularly in dealing with human factors. Author (GRA)

N83-26729# National Academy of Sciences - National Research Council, Washington, D. C. Subcommittee on Postperformance Evaluation of Research.
QUALITY OF RESEARCH IN SCIENCE: METHODS FOR POSTPERFORMANCE EVALUATION IN THE NATIONAL SCIENCE FOUNDATION
1982 125 p refs
(Contract NSF C-EVL-81-15789)
(PB83-144972; NSF/OAO-82001) Avail: NTIS HC A06/MF A01 CSCL 05A

The results of basic research in science are assessed. It was concluded that: (1) postperformance evaluation can and should be carried out at the program or division level; and (2) postperformance evaluation at the individual project level is best done in the course of reviewing proposals for the renewal of research grants. GRA

N83-26730# National Academy of Sciences - National Research Council, Washington, D. C.
SURVEY OF ATOMIC AND MOLECULAR SCIENCE IN THE UNITED STATES, 1980 - 1981 Final Report
Oct. 1982 105 p
(Grants NSF PHY-81-16408; NSF PHY-78-25026)
(PB83-150557) Avail: NTIS HC A06/MF A01 CSCL 05A

This report is based on a study of the field of atomic and molecular science carried out during 1980-1981 through a comprehensive survey of participants in the field. Its purpose is to establish a quantitative basis for describing the national research effort in this field. Such a basis is needed in connection with several aspects of the planning process: external representation, internal communication and coordination, and a general assessment of the health, strengths, and weaknesses of the field. The study attempts to develop the first comprehensive and statistical description of the broad field of atomic and molecular science in the United States. It thus amplifies and updates materials from previous studies of the field. Author (GRA)

N83-26731# National Academy of Sciences - National Research Council, Washington, D. C. Committee on Arctic Reseach Policy.
A UNITED STATES COMMITMENT TO ARCTIC RESEARCH Report, May 1981 - Jun. 1982
18 Nov. 1982 29 p refs Sponsored in part by Andrew W. Mellon Foundataion and NSF
(PB83-147587) Avail: NTIS HC A03/MF A01 CSCL 05A

The report reviews U.S. government responsibilities and policies for Arctic research, identifies distinctive features of Arctic research, discusses the need for a policy-guided Arctic Research Plan, and offers recommendations on the goals and development of an Arctic Research Policy. GRA

N83-26732# General Accounting Office, Washington, D. C. Accounting and Financial Management Div.
BENCHMARKING: COSTLY AND DIFFICULT, BUT OFTEN NECESSARY WHEN BUYING COMPUTER EQUIPMENT OR SERVICES
22 Oct. 1982 58 p
(PB83-150961; GAO/AFMD-83-5; B-208077) Avail: NTIS HC A04/MF A01 CSCL 05A

The Federal Government uses benchmaking for most competitive computer procurements to ensure that each vendor's proposal is evaluated fairly. This computer system validation process is necessary--but costly and difficult for both the vendors and the Government GAO studied 73 computer procurements to identify (1) problems agencies have encountered in the benchmark process, (2) alternative evaluation techniques that can be used, and (3) the cost of benchmarking. The General Services Administration should revise the procurement regulations and issue guidance to help agencies avoid benchmaking problems. (GRA)

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N83-26733# Los Alamos Scientific Lab., N. Mex.
SAVEX8: A UTILITY TO SAVE, GET, AND RENEW FILES
Charles Snell Jun. 1982 28 p
(Contract W-7405-eng-36)
(LA-9355-MS) Avail: NTIS HC A03/MF A01

SAVEX8 is a utility program designed to save, store, or replace files on Mass storage and to get files from Mass. Among other capabilities, SAVEX8 can operate in a suspend/wake-up cycle to intercept files appearing under its account number and save them on Mass. An option is provided to save graphics Metafiles on Mass storage and also give them away for processing as film output with PFILM. SAVEX8 can be instructed to begin an operation at a specified date and time (example: get my files from Mass at 7:00 a.m. tomorrow morning). If a Mass operation fails, SAVEX8 will suspend and retry repeatedly until success is

achieved. Finally, SAVEX8 renews all files under its account number at intervals so that they will not expire of old age. S.L.

N83-26734# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ASSOCIATIVE DATA ACCESS METHOD (ADAM) M.S. Thesis
James R. Holten, III Dec. 1981 271 p refs
(AD-A124674; AFIT/GCS/EE/82D-19) Avail: NTIS HC A12/MF A01 CSCL 09/2

A software solution to the multikey access problem is presented. The result, ADAM, models associative memory techniques to obtain fast retrieval times and efficient data storage. A multidimensional tree structure is used. Each data item key is one dimension, and at each lower level in the tree each dimension is divided into successively smaller half-intervals. Unlike m-way trees with fixed sized nodes and K-D tree levels, each ADAM map level is a linear linked list. Each node of the ADAM level linear linked list is the root of a subtree, or is the terminal node of a data item in the data set. The resulting data structure is, in many cases, more storage efficient than normal linear storage of the data items. This is due to the suppression of duplicate high order bits among the data items. The method allows retrieval of associative data subsets from the associative data set much faster than other multikey access techniques. Analysis of variations on ADAM are suggested, especially for application to very large (over 100000 data items per data set) multiuser databases.
Author (GRA)

N83-26735# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
MODELS OF AN INTEGRATED DESIGN DATA BASE IN SUPPORT OF A DESIGN AUTOMATION SYSTEM M.S. Thesis
Michael Allen Tebo Dec. 1982 181 p refs
(AD-A124726; AFIT/GOS/EE/82D-35) Avail: NTIS HC A09/MF A01 CSCL 09/2

This report presents a model for an integrated design data base that will be used within an integrated design system for microelectronics. This report also describes a model of an integrated design system, whose functions include a single, flexible interface between the designer and the design system. These two models provide a conceptual-level design of a Design Automation System; however, the emphasis in this report is on the data base model. The results described in this report are two of the models necessary for the design of a Design Automation (DA) System. The first model is a high-level design which shows the components and the interactions of these components within the DA System. The second model constitutes the design at the conceptual-level of the data base required by the DA System. This data base, called an Integrated Design Data Base, is an integral part of the DA System. The model of the data base defines the data requirements of the design tasks within the microelectronic design cycle. Author (GRA)

N83-26736# Defense Technical Information Center, Alexandria, Va.
GOVERNMENT ACRONYMS AND ALPHABETIC ORGANIZATIONAL DESIGNATIONS USED IN DTIC
Loretta M. Brown Jan. 1983 262 p Supersedes DTIC/TR-81/5 (AD-A124500; DTIC/TR-83/1; DTIC/TR-81/5) Avail: NTIS HC A12/MF A01 CSCL 05/2

This compilation is a guide to acronyms as assigned by the Defense Technical Information Center (DTIC). The listing contains entries from the Department of Defense (DOD), Federal Government and foreign military organizations. The acronyms reflect reports processed into the DTIC collections. GRA

N83-26737# Smithsonian Institution, Washington, D. C. Task Force on National Information Systems.
AUTOMATION AND THE NAVAL LABORATORIES ARCHIVAL PROGRAM: A REPORT AND RECOMMENDATIONS Final Report, Aug. - Sep. 1982
David Bearman Nov. 1982 33 p
(Contract N00167-83-GO-0140)
(AD-A124565; DTNSRDC-NLHP-CR-1-82) Avail: NTIS HC A03/MF A01 CSCL 05/2

This automation study recommends an integrated system of records administration for records of permanent archival value consisting of two basic parts: (1) A central collection of general reference documents on Navy R&D, to be located in the Office of the Historian of Navy Laboratories; and (2) permanent archival documents generated by each of the laboratories, to remain in the laboratory or in a Federal records center under the control of the laboratory until such time as the records were relinquished to the National Archives and Records Services. This integrated system of archival records management would be guided by the Navy Laboratories Archives through the use of a regulated, automated information collection system. Integrated automated information systems within each of the laboratories should be of direct benefit (1) to the offices that input data, by allowing them to retrieve it in a more efficient and cost effective manner; (2) to other users by making available information concerning permanent records related to Navy R&D; and (3) to the Navy Laboratories History Program, by providing it with knowledge of historically valuable records and their location with the Navy Laboratory System. GRA

N83-26738# Stanford Univ., Calif. Dept. of Computer Science.
DESIGN OF A UNIVERSAL RELATION DATABASE SYSTEM Annual Report, 1 Sep. 1981 - 31 Aug. 1982
Jeffrey D. Ullman 1 Sep. 1982 6 p refs
(Grant AF-AFOSR-0212-80; AF Proj. 2304)
(AD-A125168; AFOSR-83-0020TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

While the relational model removes some of the task of navigation in the database from the user, it still leaves navigational responsibility with the user when multirelational queries are involved. To remove this responsibility from the user, the authors have begun implementing a universal relation user interface, that allows the user to see the data as one large relation, i.e., table, over all the attributes. Since there may be more than one connection among the attributes mentioned in a query, they have developed a fairly complex theory to allow the database designer to force certain connections to be taken by the database system and to aid him by suggesting connections that the authors believe to be natural. This theory includes the hypergraph representation of databases, explored last year, and the notion of acyclic hypergraphs, which are those with unique connections among attributes. Author (GRA)

N83-26739# Stanford Univ., Calif. Dept. of Computer Science.
MODELLING DEGREES OF ITEM INTEREST FOR A GENERAL DATABASE QUERY SYSTEM
Neil C. Rowe Apr. 1982 39 p
(Contract N00039-82-G-0250)
(AD-A125041; SU-STAN-CS-82-947) Avail: NTIS HC A03/MF A01 CSCL 12/1

Many databases support decision making. Often this means choices between alternatives according to partly subjective or conflicting criteria. Database query languages are generally designed for precise, logical specification of the data of interest, and tend to be awkward in the aforementioned circumstances. Information retrieval research suggests several solutions, but there are obstacles to generalizing these ideas to most databases. To address this problem a methodology for automatically deriving and monitoring degrees of interest among alternatives for a user of a database system is proposed. This includes a decision theory model of the value of information to the user, and inference mechanisms, based in part on ideas from artificial intelligence, that can tune the model to observed user behavior. This theory has important applications to improving efficiency and cooperativeness of the interface between a decision maker and a database system.
Author

N83-26740# California Univ., Livermore. Lawrence Livermore Lab. Dept. of Computation.
REQUIREMENTS FOR ARCHIVAL/RETRIEVAL, MECHANICS OF MATERIALS LABORATORY

J. Joseph Brandt 24 Jan. 1983 22 p
(Contract W-7405-eng-48)
(DE83-006450; UCID-19670) Avail: NTIS HC A02/MF A01

This software system should provide the following functions: the ability to archive data acquired on any LSI-11 based data acquisition in the Materials Engineering Division, certainly any data acquired on the LSI-11 data acquisition systems in the Mechanics of Materials Lab; the ability to list or search the archived data using various previously defined unique identifiers; and the ability to retrieve data from the archival system. This retrieval process should be able to tell the operator which mag tape to hang in order to get the desired data. DOE

N83-26741# Energy Information Administration, Washington, D.C.
EIA PUBLICATIONS DIRECTORY, A USER'S GUIDE, 1981 Annual Report
Apr. 1982 278 p
(DE83-006474; DOE/EIA-0149(77-81)) Avail: NTIS HC A13/MF A01

Abstracts of publication dealing with energy use and energy technology are given. Listings are given for coal, crude oil, fuel oils, marketing, and transportation energy. DOE

N83-26742# California Univ., Berkeley. Lawrence Berkeley Lab.
PROBLEMS IN SPATIAL DATA ANALYSIS
D. W. Merrill Feb. 1982 7 p refs Presented at ASA Users Group Intern. Meeting, San Francisco, 14 Feb. 1982
(Contract DE-AC03-76SF-00098)
(DE83-005431; LBL-14047; CONF-820219-5) Avail: NTIS HC A02/MF A01

In SEEDIS, the Socio-Economic Environment Demographic Information System, some 70 geographic levels (e.g. 1970 or 1980 counties) are defined, corresponding to archieved data files. If efficiency considerations are ignored, each file needs to be stored only at the most detailed level for which the data are complete. Geocode correspondence files provide the information required to transform data from any level to any other level. Inevitable, disaggregation requires ad hoc proportionality assumptions; different assumptions are suitable for different applications. In SEEDIS, unlike other systems, these assumptions are under the user's control. The SEEDIS geocode conversion files and proxy variables files can be used to aggregate and disaggregate arbitrary data files, either within or outside SEEDIS. Other files now being developed describe other dimensions of the data, for example industrial or occupational classification. DOE

N83-26743# Florida Univ., Gainesville. Database Systems Research and Development Center.
LOGICAL AND PHYSICAL MODELING AND DESIGN OF SCIENTIFIC AND STATISTICAL DATABASES FOR ENERGY RESEARCH Progress Report
S. Y. W. Su, S. B. Navathe, and D. S. Batony 1983 44 p refs
(Contract DE-AS05-81ER-10977)
(DE83-006526; DOE/ER-10977/1) Avail: NTIS HC A03/MF A01

Research is summarized in three areas: semantic modeling and language design; data base mapping and integration; and physical design. DOE

N83-26744# Research Inst. of National Defence, Stockholm (Sweden).
COMMON DATA BASE EXPERIMENT: EVENT DEFINITION FROM SHORT-PERIOD WAVE FORM DATA
Nils-Olov Bergkvist, Eva Johannisson, and Ingvar Nedgaard Jan. 1983 68 p
(FOA-C-20484-T1) Avail: NTIS HC A04/MF A01

Use of short period wave forms (level 2 data) to check the definition of small events defined in common data base experiment (CDBE) to define new events using the reported array parameters azimuth and slowness, and to explain reported arrival times that can not be associated to any event in CDBE is described. Twenty-three small events defined by CDBE but not by US Geological Survey were analyzed; for 22 events the definition is supported by level 2 data. Unassociated array detections were analyzed in a search for new events. Through analysis of complete wave forms new arrival times can be associated and 38 events were found. Unassociated arrivals reported by two single stations were investigated. More than 2/3 of these arrivals can be explained in the level 2 analysis or from known events reported by US Geological Survey. Author (ESA)

N83-26745# InterAmerica Research Associates, Rosslyn, Va.
AN EVALUATION OF SCIENTIFIC AND TECHNICAL INFORMATION DISTRIBUTION AND USE IN LATIN AMERICA: THE NTIS PROGRAM IN FIVE SELECTED COUNTRIES
Marina Fanning-Firfer 1982 62 p
(Contract AID-LAC-0044-C-00-1048-00)
(PB83-113860) Avail: NTIS HC A04/MF A01 CSCL 05A

This paper evaluates the operations of the National Technical Information Service of the U.S. Department of Commerce concerning the dissemination of its information in Latin America. The study focused on five countries, Mexico, Costa Rica, Colombia, Peru, and the Dominican Republic, and interviewed a total of ninety-nine end users. The major findings of the study was that NTIS information, when accessed, contributed significantly to technological change. This report outlines the scope of work for the evaluation and the study design. The findings are detailed and the conclusions and recommendations presented. Annexes present the Pre-Test Interview Guide, a Telephone Contact Sheet, a Call Record Sheet, an interview Guide, and interviewer instructions. GRA

N83-26746# National Library of Medicine, Bethesda, Md. Bibliographic Services Div.
MEDICAL SUBJECT HEADINGS: SUPPLEMENTARY CHEMICAL RECORDS, 1983
Dec. 1982 981 p
(PB83-140640; NLM-MED-82-07) Avail: NTIS HC A99/MF A01 CSCL 05B

Contains records of approximately 25,000 chemicals which, since 1970, were mentioned in a significant way in journals indexed in MEDLINE, the National Library of Medicine's online bibliographic database. Originally housed in a manual card file, these records were incorporated as a subset of the MEDLARS MeSH (Medical Subject Headings) file, and became searchable online in June 1980. The publication is intended to assist indexers, and the users of Index Medicus and MEDLINE. For the indexer, it provides more specific entries than those available in the printed MeSH. It permits users of index Medicus to locate the chemical subject headings under which citations referring to a more specific chemical can be found. GRA

N83-26747# National Bureau of Standards, Washington, D.C. National Engineering Lab.
A COMPUTER DATA BASE SYSTEM FOR INDEXING RESEARCH PAPERS Final Report
Judith T. Calabrese, Lawrence J. Kaetzel, Robert A. Glass, and George R. Smith Oct. 1982 105 p Supersedes NBS-TN-1123 (PB83-137851; NBS-TN-1167; NBS-TN-1123) Avail: NTIS HC A06/MF A01 CSCL 05B

The Kaetzel, Glass, Smith (KGS) data base system permits users to index, edit, classify, and retrieve scientific research paper citations. The system was modified and enhanced. All programs are written in standard FORTRAN VII Level I programming language providing transportability among computer systems. Retrieval time was greatly reduced by changing from a sequential access method to an indexed, directory lookup file structure which allows faster and more efficient random access. The file structure is machine independent. Because of the responsiveness of the extract mode, the one key retrieval is unnecessary and was deleted from the revised system. GRA

N83-26748# University Coll., Dublin (Ireland). Dept. of Computer Science.
RETRIEVAL EFFECTS OF QUERY EXPANSION ON A FEEDBACK DOCUMENT RETRIEVAL SYSTEM Ph.D. Thesis
Alan Frances Smeaton May 1982 211 p refs

(PB83-147686; TR-2) Avail: NTIS HC A10/MF A01 CSCL 05B

This thesis presents the results of an experimental investigation into the effects that various forms of query expansion have on the retrieval effectiveness of a document retrieval system (DRS). A comprehensive theoretical overview of the probabilistic approach to modeling a DRS is given, and from this theoretical background some heuristic query expansion techniques are proposed. Retrieval results are given when query expansion strategies using the maximum spanning tree, nearest neighbors to query terms, or index terms from known relevant documents, are incorporated into an iterative feedback retrieval system. Author (GRA)

N83-26749# Swedish Council for Building Research, Stockholm.
THE INFORMATION CONCEPT IN BUILDING: REPORT OF THE CIB INFORMATION STUDY GROUP
1982 194 p refs
(PB83-141267; CID/PUB-65; D19-1982; ISBN-91-540-3804-7) Avail: NTIS HC A09/MF A01 CSCL 05B

CIB, The International Council for Building Research, Studies and Documentation, was initially established to promote information transfer. Information and documentation has always ranked as one of the foremost issues in CIB. To ensure that CIB would remain well placed to take advantage of technological progress to clarify the actual background for future activities and to develop the basis for an up to date CIB information policy the Board set up the information Study Group in 1979. This is the report of the CIB information Study Group. The information Study Group was commissioned to propose an information policy for CIB. It was charged with considering the entire information field within CIB paying particular reference to the work of existing and needed Working Commissions. GRA

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

N83-26750# Purdue Univ., Lafayette, Ind.
VERIFYING USEFULNESS OF ENGINEERING PROCESS MODELS APPLIED TO FORECASTING Final Report
A. B. Whinston Jun. 1982 166 p refs Sponsored by Electric Power Research Inst.
(EPRI Proj. 867-1)
(DE82-905303; EPRI-EA-2441) Avail: NTIS HC A08/MF A01

The concept of production is a central theme in the development of economics. Economists have continually strived to include engineering information in their forecasts and analyses. Energy economists are extremely active in the use of engineering process models for economic analysis. Research efforts have developed statistical methods for transferring the process information. The validity of these efforts are explored, and alternatives suggested. Classic economic production theory and efforts to use statistical output from process models in forecasting applications are reviewed. An alternative application of functions known as cubic splines is developed. An error-minimizing nonstatistical technique that utilizes convex properties of the process models is illustrated. The research also explores the use of elasticities of substitutions and a technique known as diffusive substitution. Appendixes discuss multioutput production, aggregation, and stochastic specifications of process models. DOE

N83-26751# Engineering-Economics Associates, Inc., Berkeley, Calif.
INTERACTIVE COMPUTER PROGRAMS FOR MANIPULATING DETAILED LEONTIEF TYPE INPUT-OUTPUT MODELS
Everard M. Lofting and A. David Johnson May 1982 89 p refs (Contract DI-BM-J0-113107)
(PB83-149526; BM-OFR-199-82) Avail: NTIS HC A05/MF A01 CSCL 05C

A series of interactive FORTRAN computer programs for manipulating Leontief-type input-output models are presented with documentation and a descriptive users manual. Sample program outputs are annotated and described. Author (GRA)

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N83-26752# Committee on Commerce, Science, and Transportation (U. S. Senate).
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT
Washington GPO 1983 45 p Rept. to accompany S. 1096 presented to the Comm. on Com., Sci., and Transportation, 98th Congr., 1st Sess., 16 May 1983
(S-Rept-98-108) Avail: US Capitol, Senate Document Room

The Committee on Commerce, Science, and Transportation favorably reported on Senate bill 1096 which authorizes to NASA for 1984 a total of $7,278,100,000. Of this amount, $5,888,500,000 is for research and development, $142,100,000 for construction of facilities, and $1,246,500,000 for research and program management. The total space transportation systems budget is $3,558 million. some $833 million is provided for space science programs and $321 million is provided for space applications. A.R.H.

N83-26753# Committee on Science and Technology (U. S. House).
AUTHORIZING APPROPRIATIONS TO THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION FOR FISCAL YEAR 1984
GPO 1983 213 p Report on H.R. 2065 presented to the Comm. of the Whole House on the State of the Union, 98th Congr., 1st Sess., 15 Apr. 1983
(GPO-17-041; H-Rept-98-65) Avail: US Capitol House Document Room

Appropriations for the National Aeronautics and Space Administration are authorized for fiscal year 1984 for research and development, construction and facilities, and research and program management. Appropriations are also authorized for the National Oceanic and Atmospheric Administration to operate a land remote sensing system and to provide limitations on the operation of the system. L.F.M.

N83-26754# Committee on Appropriations (U. S. House).
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT, INDEPENDENT AGENCIES APPROPRIATIONS FOR 1984
Washington GPO 1983 961 p Hearings before a subcomm. of the Comm. on Appropriations, 98th Congr., 1st Sess., 22 Mar. 1983
(GPO-19-995) Avail: Committee on Appropriations

Within the framework of the fiscal 1984 budget NASA addressed the following concerns: expansion by private sector investment, international cooperation, economical and scientific benefits through exploration, strengthening of U.S. security, maintenance of space leadership, concern over the fifth space shuttle, the need to start and maintain a twenty-four flight per year schedule, and repair and maintenance of the space shuttles. B.G.

N83-26755# Committee on Appropriations (U. S. House).
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT-INDEPENDENT AGENCIES APPROPRIATION ACT, 1984
Washington GPO 1983 43 p A bill referred to the Comm. on Appropriations, 98th Congr. 1st Sess., 24 May 1983
(H-Rept-98-223) Avail: US Capitol, House Document Room

The budget appropriations for FY 1983 for the National Science Foundation, the National Aeronautics and Space Administration, the Department of Housing and Urban Development-Independent Agencies are presented. For individual titles, see N83-26756 through N83-26756.

N83-26756# Committee on Appropriations (U. S. House).
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

In its Dept. of Housing and Urban Develop.-Independent Agencies Appropriation Act, 1984 1983 p 20-22 (For primary document see N83-26755 15-84)
Avail: US Capitol, House Document Room

The NASA budget appropriations for FY 1983 are presented for the following areas: research and development, space transportation systems, the space station, physics and astronomy (spacelab payloads), space telescope development, expendable launch vehicles, maintenance and supplies for the tracking and data relay satellite system, and general repair and modification of facilities.
B.G.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N83-26757*# United Technologies Corp., East Hartford, Conn.
USER'S MANUAL FOR AXISYMMETRIC DIFFUSER DUCT (ADD) CODE. VOLUME 1: GENERAL ADD CODE DESCRIPTION Final Report
O. L. Anderson, G. B. Hankins, Jr., and D. E. Edwards Feb. 1982 90 p 3 Vol.
(Contracts DEN3-235; DE-AI01-77CS-51040)
(NASA-CR-165598-Vol-1; DOE/NASA/0235-2-Vol-1; NAS 1.26:165598-Vol-1; UTRC81-65-Vol-1) Avail: NTIS HC A05/MF A01 CSCL 09B

This User's Manual contains a complete description of the computer codes known as the AXISYMMETRIC DIFFUSER DUCT code or ADD code. It includes a list of references which describe the formulation of the ADD code and comparisons of calculation with experimental flows. The input/output and general use of the code is described in the first volume. The second volume contains a detailed description of the code including the global structure of the code, list of FORTRAN variables, and descriptions of the subroutines. The third volume contains a detailed description of the CODUCT code which generates coordinate systems for arbitrary axisymmetric ducts. DOE

N83-26758*# United Technologies Corp., East Hartford, Conn.
USER'S MANUAL FOR AXISYMMETRIC DIFFUSER DUCT (ADD) CODE. VOLUME 2: DETAILED ADD CODE DESCRIPTION Final Report
O. L. Anderson, G. B. Hankins, Jr., and D. E. Edwards Feb. 1982 271 p refs 3 Vol.
(Contracts DEN3-235; DE-AI01-77CS-51040)
(NASA-CR-165598-Vol-2; DOE/NASA/0235-2-Vol-2; NAS 1.26:165598-Vol-2; UTRC81-65-Vol-2) Avail: NTIS HC A12/MF A01 CSCL 09B

The global structure of the code, list of FORTRAN variables, and descriptions of the subroutines for the axisymmetric diffuse duct program are presented. A.R.H.

N83-26759*# United Technologies Corp., East Hartford, Conn.
USER'S MANUAL FOR AXISYMMETRIC DIFFUSER DUCT (ADD) CODE. VOLUME 3: ADD CODE COORDINATE GENERATOR Final Report
O. L. Anderson, G. B. Hankins, Jr., and D. E. Edwards Feb. 1982 90 p ref 3 Vol.
(Contracts DEN3-235; DE-AI01-77CS-51040)
(NASA-CR-165598-Vol-3; DOE/NASA/0235-2-Vol-3; NAS 1.26:165598-Vol-3; UTRC81-65-Vol-3) Avail: NTIS HC A05/MF A01 CSCL 09B

This User's Manual contains a complete description of the computer codes known as the Axisymmetric Diffuser Duct (ADD) code. It includes a list of references which describe the formulation of the ADD code and comparisons of calculation with experimental flows. The input/output and general use of the code is described in the first volume. The second volume contains a detailed description of the code including the global structure of the code, list of FORTRAN variables, and descriptions of the subroutines. The third volume contains a detailed description of the CODUCT code which generates coordinate systems for arbitrary axisymmetric ducts. Author

N83-26760*# Kansas Univ. Center for Research, Inc., Lawrence.
AN INVESTIGATION OF THE INTERNAL AND EXTERNAL AERODYNAMICS OF CATTLE TRUCKS Final Report
Vincent U. Muirhead May 1983 87 p refs
(Contract NAG4-8)
(NASA-CR-170400; NAS 1.26:170400; KU-FRL-541-2) Avail: NTIS HC A05/MF A01 CSCL 13F

Wind tunnel tests were conducted on a one-tenth scale model of a conventional tractor trailer livestock hauler to determine the air flow through the trailer and the drag of the vehicle. These tests were conducted with the trailer empty and with a full load of simulated cattle. Additionally, the drag was determined for six configurations, of which details for three are documented herein. These are: (1) conventional livestock trailer empty, (2) conventional trailer with smooth sides (i.e., without ventilation openings), and (3) a stream line tractor with modified livestock trailer (cab streamlining and gap fairing). The internal flow of the streamlined modification with simulated cattle was determined with two different ducting systems: a ram air inlet over the cab and NACA submerged inlets between the cab and trailer. The air flow within the conventional trailer was random and variable. The streamline vehicle with ram air inlet provided a nearly uniform air flow which could be controlled. The streamline vehicle with NACA submerged inlets provided better flow conditions than the conventional livestock trailer but not as uniform or controllable as the ram inlet configuration. B.W.

N83-26761*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Electric and Hybrid Vehicle System Research and Development Project.
ELECTRIC VEHICLE CHASSIS DYNAMOMETER TEST METHODS AT JPL AND THEIR CORRELATION TO TRACK TESTS
J. Marte and J. Bryant Apr. 1983 78 p refs
(Contract DE-AI01-78CS-54209)
(NASA-CR-172651; JPL-5030-564; NAS 1.26:172651; DOE/CS-54209/11) Avail: NTIS HC A05/MF A01 CSCL 13F

Early in its electric vehicle (EV) test program, JPL recognized that EV test procedures were too vague and too loosely defined to permit much meaningful data to be obtained from the testing. Therefore, JPL adopted more stringent test procedures and chose the chassis dynamometer rather than the track as its principal test technique. Through the years, test procedures continued to evolve towards a methodology based on chassis dynamometers which would exhibit good correlation with track testing. Based on comparative dynamometer and track test results on the ETV-1 vehicle, the test methods discussed in this report demonstrate a means by which excellent track-to-dynamometer correlation can be obtained. Author

N83-26762*# Mechanical Technology, Inc., Latham, N. Y.
AUTOMOTIVE STIRLING ENGINE DEVELOPMENT PROGRAM Quarterly Technical Report, 4 Oct. - 31 Dec. 1981
Therese A. Derikart, ed. Sep. 1981 88 p refs
(Contracts DEN3-32; EC-77-A-31-10040)
(NASA-CR-165263; DOE/NASA/0032-81/11; NAS 1.26:165263; MTI-81ASE-185QT-11) Avail: NTIS HC A05/MF A01 CSCL 13F

The automotive Stirling engine development program is reviewed. Reference engine, component and subsystem development, engine testing, and computer models are summarized.
Author

N83-26763*# Garrett Turbine Engine Co., Phoenix, Ariz.
ADVANCED GAS TURBINE (AGT) POWERTRAIN SYSTEM DEVELOPMENT FOR AUTOMOTIVE APPLICATIONS Semiannual Progress Report, Jan. - Jun. 1982
Dec. 1982 76 p refs
(Contract DEN3-167)
(NASA-CR-168104; NAS 1.26:168104; GTEC-31-3725(5); SAPR-5) Avail: NTIS HC A05/MF A01 CSCL 13F

Topics covered include the AGT 101 engine test; compressor design modification; cold air turbine testing; Mod 1 alloy turbine rotor fabrication; combustion aspects; regenerator development; and thermal screening tests for ceramic materials. The foil gas bearings, rotor dynamics, and AGT controls and accessories are also considered. A.R.H.

N83-26764# Los Alamos Scientific Lab., N. Mex.
OUTLOOK FOR IMPROVED AUTOMOBILE FUEL EFFICIENCY
A. Ford and R. J. Sutherland Jun. 1982 125 p refs
(Contract W-7405-eng-36)
(DE82-018349; LA-9414-MS) Avail: NTIS HC A06/MF A01

The prospects of improved fuel efficiency in new cars through 1995 are analyzed. The costs of retooling and the optimal rate of retooling as a function of the price of gasoline and the discounted life of the car are estimated. With these estimates, and an econometric model of market shares of five car classes, it is estimated that the average new fleet fuel efficiency will be 32 mpg in 1985 and about 39 mpg in 1995 if all car classes are optimally retooled. If only three of five car classes are retooled, the new car fleet should obtain 31 mpg in 1985, which exceeds the Government mandated 27.5 mpg. Three potential policies - differential pricing, gas guzzler tax, and a gasoline tax are examined in terms of their cost and effectiveness of shifting the mix in demand for new cars and thereby improving overall fuel economy. These policies would produce a large redistribution of expenditures, and only a moderate improvement in fuel efficiency would be achieved. DOE

N83-26765# Environmental Protection Agency, Ann Arbor, Mich. Inspection and Maintenance Staff.
DERIVATION OF I/M BENEFITS FOR PRE-1981 LIGHT DUTY VEHICLES FOR LOW ALTITUDE, NON-CALIFORNIA AREAS
James Rutherford Jun. 1982 69 p
(PB83-145102; EPA-AA-IMS-82-3) Avail: NTIS HC A04/MF A01 CSCL 13F

The derivation of the Inspection/Maintenance (I/M) emission reduction benefits for pre-1981 model year vehicles (non-California low altitude) which were prepared for use in an emission factor model, MOBILE2 is presented. The MOBILE2 is a computer program which estimates fleet average emissions of the three regulated pollutants (hydrocarbons, carbon monoxide, and nitrous oxides) at various points in time under varying ambient and driving conditions. The effects of I/M are applied in MOBILE2 as percent reductions, or credits, to average emissions for various segments of the fleet. Author

N83-26766# Environmental Protection Agency, Ann Arbor, Mich. Control Technology Assessment and Characterization Branch.
THE EFFECTS OF ACCELERATION RATE ON VEHICLE EXHAUST EMISSIONS AND FUEL ECONOMY
Larry C. Landman Aug. 1982 141 p refs
(PB83-142711; EPA/AA/CTAB/TA/82-2) Avail: NTIS HC A07/MF A01 CSCL 13F

This report summarizes a test program which was designed to explore the impact on exhaust emissions and fuel economy of coupling the dynamometer rollers (front and rear) and of using acceleration rates higher than those used on the Federal Test Procedure (FTP). A total of six vehicles were tested in this program. All five gasoline-fueled exhibited increases in hydrocarbons (HC) and carbon monoxide (CO) emissions on the Federal Test Procedure (FTP) driving cycle when the dynamometer rollers were coupled. The othe results are strongly vehicle dependent. Author

88 SPACE SCIENCES (GENERAL)

N83-26767*# National Academy of Sciences - National Research Council, Washington, D. C. Astronomy Survey Committee.
ASTRONOMY AND ASTROPHYSICS FOR THE 1980'S, VOLUME 1 Final Report
1982 204 p Sponsored in part by NASA and NSF
(NASA-CR-170147; NAS 1.26:170147; PB83-141309; LC-82-8014; ISBN-0-309-03249-0) Avail: NTIS HC A10/MF A01 CSCL 03B

The programs recommended address the most significant questions that confront contemporary astronomy and fall into three general categories: prerequisites for research initiatives, including instrumentation and detectors, theory and data analysis, computational facilities, laboratory astrophysics, and technical support at ground-based observatories; programs including an Advanced X-ray Astrophysics Facility, a Very-Long Baseline Array, a Technology Telescope and a Large Deployable Reflector; and programs for study and development, including X-ray observatories in space, instruments for the detection of gravitational waves from astronomical objects, and long duration spaceflights of infrared telescopes. Estimated costs of these programs are provided. GRA

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N83-26768*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
A STUDY INTO THE LOSS OF LOCK OF THE SPACE TELESCOPE FINE GUIDANCE SENSOR
Michael E. Polites Apr. 1983 31 p refs
(NASA-TM-82523; NAS 1.15:82523) Avail: NTIS HC A03/MF A01 CSCL 03A

The results of a study into the loss of lock phenomenon associated with the Space Telescope Fine Guidance Sensor (FGS) are documented. The primary cause of loss of lock has been found to be a combination of cosmic ray spikes and photon noise due to a 14.5 Mv star. The probability of maintaining lock versus time is estimated both for the baseline FGS design and with parameter changes in the FGS firmware which will improve the probability of maintaining lock. The parameters varied are changeable in-flight from the ground and hence do not impact the design of the FGS hardware. Author

N83-26769*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
INVESTIGATION DEVELOPMENT PLAN FOR REFLIGHT OF THE SMALL HELIUM-COOLED INFRARED TELESCOPE EXPERIMENT. VOLUME 1: INVESTIGATION AND TECHNICAL/MANAGEMENT
25 May 1981 106 p 2 Vol.
(Contract NAS5-26097)
(NASA-CR-170507-Vol-1; NAS 1.26:170507-Vol-1) Avail: NTIS HC A06/MF A01 CSCL 03A

The Infrared Telescope (IRT) is designed to survey extended celestial sources of infrared radiation between 4 and 120 micrometers wavelength. It will provide data regarding Space Shuttle induced environmental contamination and the zodical light. And, it will provide experience in the management of large volumes of superfluid helium in the space environment. Author

N83-26770*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
EXPERIMENT REQUIREMENTS DOCUMENT FOR REFLIGHT OF THE SMALL HELIUM-COOLED INFRARED TELESCOPE EXPERIMENT
[1982] 102 p 2 Vol.
(Contract NAS5-26097)

(NASA-CR-170379; NAS 1.26:170379) Avail: NTIS HC A06/MF A01 CSCL 03A

The four astronomical objectives addressed include: the measurement and mapping of extended low surface brightness infrared emission from the galaxy; the measurement of diffuse emission from intergalactic material and/or galaxies and quasi-stellar objects; the measurement of the zodiacal dust emission; and the measurement of a large number of discrete infrared sources. B.G.

N83-26771# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

ULTRAVIOLET PHOTOMETRY TELESCOPE [UM TELESCOPIO PARA FOTOMETRIA ULTRAVIOLETA]

Kalvala Ramanuja Rao and Clovis Monteiro doEspiritoSanto Jun. 1982 24 p refs In PORTUGUESE; ENGLISH summary Submitted for publication Sponsored in part by National Fund for Scientific and Technological Development

(INPE-2439-PRE/140) Avail: NTIS HC A02/MF A01

A design of a 45 cm telescope is presented, which will be flown on a stratospheric balloon to study Southern Hemisphere stars in ultraviolet radiation. A Cassegrain and a Newtonian system are considered. The Cassegrain system consists of two parabolic mirrors and the Newtonian system is made of a parabolic mirror (primary) and a plane (secondary). Using the ray tracing method, the spot diagrams are constructed for both systems and the incident rays are considered along and away from the optical axis. The results of the analysis indicate that both systems considered present a good angular resolution. However, for the purpose of construction of the telescope, the aberration produced in the Newtonian system alone were calculated. S.L.

N83-26772# Lincoln Lab., Mass. Inst. of Tech., Lexington.

A GLOBAL CALIBRATION TECHNIQUE IN USE AT THE ETS

Richard C. Ramsey, Arthur A. Mathiasen, Joseph H. Dial, and Robert L. Irelan 8 Nov. 1982 50 p refs

(Contract F19628-80-C-0002; AF Proj. 2698; AF Proj. 2295)

(AD-A123252; ETS-66; ESD-TR-82-095) Avail: NTIS HC A03/MF A01 CSCL 03/1

This report describes the installation and results of a global calibration program introduced for both telescopes at the Lincoln Laboratory Experimental Test Site. The uncorrected positional pointing errors, due primarily to tube flexure, sag and astronomical refraction, were found to be as high as ten arc minutes at low (twenty degrees) elevation angles. The calibration is performed by a software program which contains look-up tables, for each telescope, that represent ten-degree increments of azimuth and elevation. Residual errors are now less than one arc minute except for a narrow zone across the northern sky. This is a region where there was a high gradient in the uncorrected errors and the residuals here, after correction, are a maximum of three arc minutes. GRA

N83-26773# Los Alamos Scientific Lab., N. Mex.

SHORT-TIMESCALE VARIABILITY IN CATACLYSMIC BINARIES

France A. Cordova and Keith O. Mason (Univ. Coll., London) 1982 16 p refs Presented at the Conf. on Pulsations in Classical and Cataclysmic Variable Stars, Boulder, Colo., 1 Jun. 1982

(Contract W-7405-eng-36)

(DE82-019569; LA-UR-82-1945; CONF-8206101-1) Avail: NTIS HC A02/MF A01

Rapid variability, including flickering and pulsations, has been detected in cataclysmic binaries at optical and X-ray frequencies. In the case of the novalike variable TT Arietis, simultaneous observations reveal that the X-ray and optical flickering activity is strongly correlated, while short period pulsations are observed that occur at the same frequencies in both wavelength bands. DOE

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N83-26774*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

PLANETARY SIZE COMPARISONS: A PHOTOGRAPHIC STUDY

Stephen Paul Meszaros Apr. 1983 99 p refs

(NASA-TM-85017; NAS 1.15:85017) Avail: NTIS HC A05/MF A01 CSCL 03B

Over the past two decades NASA spacecraft missions obtained photographs permitting accurate size measurements of the planets and moons, and their surface features. Planetary global views are displayed at the same scale, in each picture to allow visual size comparisons. Additionally, special geographical features on some of the planets are compared with selected Earth areas, again at the same scale. Artist renderings and estimated sizes are used for worlds not yet reached by spacecraft. Included with each picture is number designation for use in ordering copies of the photos. Author

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

For spacecraft design see *18 Spacecraft Design Testing, and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

No abstracts in this category.

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N83-26775# Air Force Geophysics Lab., Hanscom AFB, Mass. Space Physics Div.

USING SOLAR RADIO BURST INTEGRATED FLUXES TO PREDICT ENERGETIC PROTON FLUX INCREASES Final Scientific Report

William R. Barron 31 Aug. 1982 34 p refs

(AF Proj. 4643)

(AD-A126329; AFGL-TR-82-0253; ERP-791) Avail: NTIS HC A03/MF A01 CSCL 03/2

Time integrated solar radio fluxes and their association with satellite observed solar energetic proton flux increases were studied. The time integration was only of the U portion of the radio burst flux increase. The best correlations between the integrated radio fluxes and the proton peak fluxes were realized when the radio fluxes were multiplied by the factor exp (-3B), where B is the angular distance, in radians, between the site of the flare and the solar footpoint of the magnetic field connection between the Sun and the Earth. The solar footpoint positions were determined from the solar wind speed. Two variate linear regressions were computed using the time integrated radio fluxes at five discrete radio frequencies in the 606 to 8800 MHz frequency interval and peak proton fluxes at 10 MeV and 30 MeV. Three variate and four variate linear regressions using different configurations of the time integrated radio fluxes were also computed. The best of all the correlations was found with the four variate regression of the three highest frequencies and the 30 MeV proton flux. Author

N83-26776*# Stanford Univ., Calif. Inst. for Plasma Research.
INVALIDITY OF LOCAL THERMODYNAMIC EQUILIBRIUM FOR ELECTRONS IN THE SOLAR TRANSITION REGION. PART 2: ANALYSIS OF A LINEAR BGK MODEL
Edward C. Shoub Nov. 1982 29 p refs Submitted for publication
(Grants NGL-05-020-272; NAGw-92; Contract N00014-75-C-0673) (NASA-CR-170349; NAS 1.26:170349; AD-A124026; SU-IPR-946) Avail: NTIS HC A03/MF A01 CSCL 03B

In an earlier paper numerical solutions of the Landau equation were obtained which show that the tail of the electron velocity distribution functions differs substantially from a local Maxwellian distribution in the solar transition region and upper chromosphere. In this paper, It is shown that a linearized version of the BGK model kinetic equation, with collision frequency proportional to 1/v cubed, can be solved analytically for the tail of the distribution function in an atmosphere with prescribed temperature and density profiles. Results for the angle-averaged distribution so obtained are shown to be in reasonably good agreement with earlier numerical results. Accurate, easily evaluated approximations for the tail of the distribution function are derived from the exact formulas. These show that both the zeroth and first angular moments of the distribution function are nearly power laws over a wide velocity range in the low transition region. It is also shown that the heat flux into lower temperature region is carried by suprathermal electrons with velocities well above local thermal velocities. The formulas given here should be useful in the calculation of electron-ion inelastic collision rates under conditions in which the local Maxwellian approximation is invalid.
Author (GRA)

N83-26777# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 458, OCTOBER 1982. PART 1: (PROMPT REPORTS). DATA FOR SEPTEMBER 1982, AUGUST 1982 AND LATE DATA
Helen E. Coffey Oct. 1982 154 p 2 Vol.
(PB83-147280; SGD-458-Pt-1; NOAA-82120202-Pt-1) Avail: NTIS HC A08/MF A01 CSCL 03B

Topics considered include the following: Alert periods; Daily solar indices; Solar flares; Solar radio emission; Inferred interplanetary magnetic field polarities; Mean solar magnetic field; Spacecraft observations; Sudden ionospheric disturbances; Cosmic rays; Geomagnetic indices; Radio propagation indices. GRA

N83-26778# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 458, OCTOBER 1982. PART 2: (COMPREHENSIVE REPORTS). DATA FOR APRIL 1982 AND MISCELLANEA
Helen E. Coffey Oct. 1982 47 p 2 Vol.
(PB83-147298; SGD-458-Pt-2; NOAA-82120203-Pt-2) Avail: NTIS HC A03/MF A01 CSCL 03B

Topics considered include the following: Solar radio emission; Energetic solar particles and plasma; solar X-ray radiation; Mass ejections from the Sun. GRA

N83-26779# National Center for Atmospheric Research, Boulder, Colo.
A USER'S GUIDE TO MAUNA LOA SOLAR OBSERVATORY'S CORONAL DATA SYSTEM
Kristine Rock and Paul Seagraves Sep. 1982 30 p refs Sponsored in part by NSF
(PB83-146217; NCAR/TN-200+IA) Avail: NTIS HC A03/MF A01 CSCL 03B

The seven data products available from the Mark III K-coronameter are described. One of these is a real time product (CORONA), four are available in near real time (1MAP, 1DATA, ACTIVTY, and DIMAGE), and two others are useful for trying to visualize the three dimensional distribution of coronal material (SHELL and HISTORY). Sufficient information for the intepretation of Mauna Loa Solar Observatory data by users outside the High Altitude Observatory's Coronal Dynamics Project is provided. GRA

N83-26441# Joint Publications Research Service, Arlington, Va.
PREDICTION AND IDENTIFICATION OF COSMIC SOLAR RADIATION FLUX AND SPECTRA
S. I. Avdyushin, N. K. Pereyaslova, P. M. Svidskiy, and A. B. Malyshev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 2, Mar. - Apr. 1983 (JPRS-83467) 13 May 1983 p 126-132 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 2, Mar. - Apr. 1983 p 86-89 (For primary document see N83-26422 15-51)
Avail: NTIS HC A07

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N83-26780*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
IMPLICATIONS OF HEAO-3 DATA FOR THE ACCELERATION AND PROPAGATION OF GALACTIC COSMIC RAYS
J. F. Ormes and R. J. Protheroe (Maryland Univ., College Park) Jan. 1983 35 p refs Submitted for publication
(NASA-TM-84964; NAS 1.15:84964) Avail: NTIS HC A03/MF A01 CSCL 03B

The energy dependence of the mean escape length of cosmic rays from the galaxy in the light of recent measurements of cosmic ray abundances from the Danish-French experiment on HEAO-3 is re-examined. The energy dependence is found to be steeper than previously thought. Author

N83-26781# Air Force Geophysics Lab., Hanscom AFB, Mass. Space Physics Div.
EFFECTS OF ASYMMETRIC MAGNETOSPHERIC CURRENTS ON COSMIC RADIATION Interim Report
Erwin O. Flueckiger (Bern Univ., Switzerland) 12 Jul. 1983 36 p refs
(AD-A126328; AFGL-TR-82-0177; ERP-783) Avail: NTIS HC A03/MF A01 CSCL 03/2

The trajectory-tracing technique was used to study the effect of perturbations in the geomagnetic field on cosmic ray particles arriving at the Earth. Variations of the cosmic ray cutoff rigidities at geomagnetic latitudes lambda = 47.78 deg and 54.77 deg (corresponding to the European neutron monitor stations Jungfraujoch and Kiel) were correlated with specific magnetic disturbances superposed locally upon the main geomagnetic field represented by a dipole field. The results show that for geomagnetic latitudes lambda < 65 (that is, for McIlwain parameters L < 5.6 r(e) the cutoff rigidities are most sensitive ot variations of the z-component of the magnetic field within geocentric distances r < 2 Lr(e) sq cos Lambda and within a longitude sector extending from the longitude of the station up to 60 deg to 90 deg to the east of it. Within this region, magnetic perturbations being overhead and immediately to the east of the station are found to have the largest relative effect. The effects of magnetospheric current systems, corresponding to the Bostroem models, on the cutoff rigidities and the asymptotic directions at Kiel, Jungfraujoch and Rome are also discussed. Author (GRA)

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N83-26782# Office of Naval Research Liason Office, Far East, APO, San Francisco, Calif.
ONR FAR EAST SCIENTIFIC BULLETIN, VOLUME 7, NUMBER 3, JUL. - SEP. 1982
1982 112 p refs

(AD-A123948) Avail: NTIS HC A06/MF A01 CSCL 05/1

This is a quarterly publication presenting articles covering recent developments in East Asian (particularly Japanese) scientific research. It is hoped that these reports (which do not constitute part of the scientific literature) will prove to be of value to scientists by providing items of interest well in advance of the usual scientific publications. The articles are written primarily by members of the staff of ONR Far East, with certain reports also being contributed by visiting stateside scientists. Occasionally a regional scientist will be invited to submit an article covering his own work, considered to be of special interest. Author (GRA)

N83-26783# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.

AIR FORCE TECHNICAL OBJECTIVE DOCUMENT FY 1984

Richard L. Verga Dec. 1982 31 p Supersedes AFWAL-TR-81-4134

(AD-A123961; AFWAL-TR-82-4201; AFWAL-TR-81-4134) Avail: NTIS HC A03/MF A01 CSCL 05/1

This technical objective Document was prepared by the Materials Laboratory and describes the Materials Technology Planning Objectives (TPOs) for meeting future Air Force operational needs. The six TPOs encompass the full spectrum of materials capabilities required for future aircraft, missile, space, and electronic systems - Thermal Protection Materials; Aerospace Structural Materials; Aerospace Propulsion Materials; Fluid, Lubricant, and Elastomeric Materials; Protective Coatings and Materials, and Electromagnetic Windows and Electronics. Presented for each TPO is the general objective, specific goals, technical approaches, and a Laboratory focal point who can facilitate face-to-face discussions with Laboratory engineers and scientists. GRA

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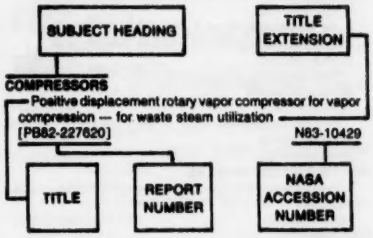
Typical Subject Index Listing



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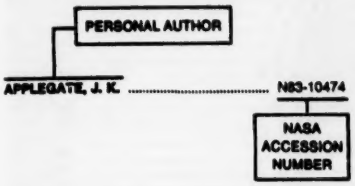

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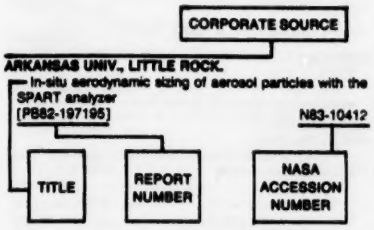

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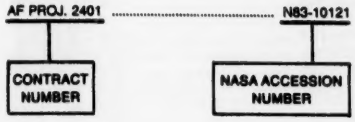

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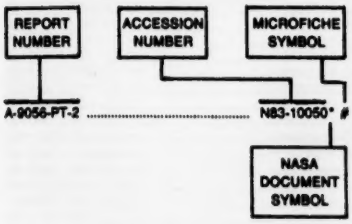

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AD-F500124 N83-25903 #
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AD-F500131 N83-25965 #

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AFATL-TR-82-10 N83-25902 #

AFGL-TR-81-0251 N83-26350 #
AFGL-TR-82-0131 N83-26344 #
AFGL-TR-82-0150 N83-26334 #
AFGL-TR-82-0173(1) N83-26338 #
AFGL-TR-82-0173(2) N83-26339 #
AFGL-TR-82-0177 N83-26781 #
AFGL-TR-82-0221(2) N83-25931 #
AFGL-TR-82-0236 N83-26341 #
AFGL-TR-82-0253 N83-26775 #
AFGL-TR-82-0280 N83-26343 #
AFGL-TR-82-0282 N83-26342 #
AFGL-TR-82-0289 N83-25781 #
AFGL-TR-82-0297 N83-26349 #
AFGL-TR-82-0320 N83-26340 #
AFGL-TR-82-0321(1) N83-25932 #
AFGL-TR-82-0339 N83-25774 #
AFGL-TR-82-0352 N83-26020 #
AFGL-TR-82-0366 N83-26367 #

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AFIT-LSSR-23-82 N83-25730 #
AFIT-LSSR-27-82 N83-26624 #
AFIT-LSSR-56-82 N83-25656 #
AFIT-LSSR-70-82 N83-25655 #

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AFIT/FEP/PH/82D-20 N83-26057 #

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AFIT/GAE/AA/79D-4 N83-25674 #

AFIT/GAE/AA/82D-1 ..... N83-25702 #
AFIT/GAE/AA/82D-3 ..... N83-26023 #
AFIT/GAE/AA/82D-5 ..... N83-26504 #
AFIT/GAE/AA/82D-7 ..... N83-25754 #
AFIT/GAE/AA/82D-8 ..... N83-26103 #
AFIT/GAE/AA/82D-9 ..... N83-25718 #
AFIT/GAE/AA/82D-13 ..... N83-25701 #
AFIT/GAE/AA/82D-14 ..... N83-26100 #
AFIT/GAE/AA/82D-15 ..... N83-25793 #
AFIT/GAE/AA/82D-16-PT-1 ..... N83-26099 #
AFIT/GAE/AA/82D-17 ..... N83-26098 #
AFIT/GAE/AA/82D-18 ..... N83-25730 #
AFIT/GAE/AA/82D-19 ..... N83-25717 #
AFIT/GAE/AA/82D-20 ..... N83-25729 #
AFIT/GAE/AA/82D-21 ..... N83-25752 #
AFIT/GAE/AA/82D-23 ..... N83-25668 #
AFIT/GAE/AA/82D-27 ..... N83-25719 #
AFIT/GAE/AA/82D-28 ..... N83-25671 #
AFIT/GAE/AA/82D-29 ..... N83-26022 #
AFIT/GAE/AA/82D-30 ..... N83-25673 #
AFIT/GAE/AA/82D-32 ..... N83-26063 #
AFIT/GAE/AA/82D-33 ..... N83-25755 #
AFIT/GAE/AA/82D-34 ..... N83-25669 #

AFIT/GAE/82D-10 ..... N83-25670 #

AFIT/GCS/EE/82D-12 ..... N83-25735 #
AFIT/GCS/EE/82D-16 ..... N83-26503 #
AFIT/GCS/EE/82D-19 ..... N83-26734 #
AFIT/GCS/EE/82D-20 ..... N83-26502 #
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AFIT/GE/EE/82D-34-VOL-1 ..... N83-26527 #
AFIT/GE/EE/82D-39 ..... N83-25988 #
AFIT/GE/EE/82D-43 ..... N83-25697 #
AFIT/GE/EE/82D-45 ..... N83-25685 #
AFIT/GE/EE/82D-49 ..... N83-25945 #
AFIT/GE/EE/82D-53 ..... N83-26537 #
AFIT/GE/EE/82D-56 ..... N83-25948 #
AFIT/GE/EE/82D-58 ..... N83-26528 #
AFIT/GE/EE/82D-61 ..... N83-26345 #
AFIT/GE/EE/82D-67 ..... N83-25930 #
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AFIT/GE/EE/82D-72 ..... N83-26501 #

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AFIT/GEP/PH/82D-5 ..... N83-26693 #
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AFOSR-82-1093TR ..... N83-25970 #
AFOSR-82-1096TR ..... N83-26000 #
AFOSR-82-1100TR ..... N83-26719 #

AFOSR-83-0002TR ..... N83-26657 #
AFOSR-83-0005TR ..... N83-26601 #
AFOSR-83-0007TR ..... N83-26632 #
AFOSR-83-0012TR ..... N83-26604 #
AFOSR-83-0017TR ..... N83-25783 #
AFOSR-83-0018TR ..... N83-26603 #
AFOSR-83-0019TR ..... N83-26600 #
AFOSR-83-0020TR ..... N83-26738 #
AFOSR-83-0035TR ..... N83-26596 #
AFOSR-83-0038TR ..... N83-26551 #
AFOSR-83-0039TR ..... N83-26718 #
AFOSR-83-1094TR ..... N83-26726 #

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AFWAL-TR-81-1131-PT-2 ..... N83-25938 #
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AFWAL-TR-81-2129 ..... N83-26640 #
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AMMRC-TR-80-35 ..... N83-26092 #
AMMRC-TR-81-38 ..... N83-26671 #
AMMRC-TR-82-12 ..... N83-25798 #
AMMRC-TR-82-50 ..... N83-25885 #
AMMRC-TR-82-58 ..... N83-25860 #

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AMTE(S)-TM-82450 ..... N83-26067 #

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ANL-82-73 ..... N83-26608 #
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ARBRL-TR-02470 ..... N83-26029 #

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ARL/PSU/TM-82-235 ..... N83-25830 #
ARL/PSU/TM-82-237 ..... N83-26611 #

ARL/STRUC-TM-345 ..... N83-25703 #

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ARO-16202.9-MS ..... N83-26110 #

ARO-16222.10-EL ..... N83-26534 #
ARO-16273.6-CH ..... N83-26704 #
ARO-16441.21-EL ..... N83-26696 #
ARO-16532.4-EL ..... N83-25998 #
ARO-16814.25-PH ..... N83-26674 #
ARO-16849.22-EL ..... N83-26697 #
ARO-16992.14-MA ..... N83-26602 #
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B-208077 ..... N83-26732 #
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BLM/YL/ES-82/03 ..... N83-26396 #
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BMFT-FB-T-81-085 ..... N83-25979 #

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BNL-31561 ..... N83-26658 #
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BNL-31674 ..... N83-26059 #
BNL-32280 ..... N83-26305 #
BNL-32519 ..... N83-26680 #

BR49564 ..... N83-26498
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BR85449 ..... N83-25773 #
BR85532 ..... N83-26529 #
BR86160 ..... N83-26496
BR86376 ..... N83-26497
BR86524 ..... N83-26043
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DE82-015474 ..... N83-26607 #
DE82-015509 ..... N83-25805 #
DE82-015513 ..... N83-25880 #
DE82-015595 ..... N83-25804 #
DE82-015811 ..... N83-26034 #
DE82-015843 ..... N83-26051 #
DE82-015845 ..... N83-25806 #
DE82-015869 ..... N83-26284 #
DE82-016661 ..... N83-26665 #
DE82-016998 ..... N83-25833 #
DE82-017000 ..... N83-26280 #
DE82-017231 ..... N83-25873 #
DE82-017235 ..... N83-25914 #
DE82-017241 ..... N83-26277 #
DE82-017286 ..... N83-25802 #
DE82-017553 ..... N83-25899 #
DE82-017681 ..... N83-26286 #
DE82-018059 ..... N83-26075 #
DE82-018068 ..... N83-26606 #
DE82-018109 ..... N83-26641 #
DE82-018169 ..... N83-26287 #
DE82-018345 ..... N83-26273 #
DE82-018349 ..... N83-26764 #
DE82-018356 ..... N83-25803 #
DE82-018408 ..... N83-26309 #
DE82-018440 ..... N83-25875 #
DE82-018555 ..... N83-26094 #
DE82-018616 ..... N83-26069 #
DE82-019095 ..... N83-26721 #
DE82-019117 ..... N83-26074 #
DE82-019123 ..... N83-26724 #
DE82-019163 ..... N83-26085 #
DE82-019170 ..... N83-25872 #
DE82-019172 ..... N83-25871 #
DE82-019221 ..... N83-26323 #
DE82-019242 ..... N83-25908 #
DE82-019305 ..... N83-26725 #
DE82-019313 ..... N83-26289 #
DE82-019410 ..... N83-26660 #
DE82-019433 ..... N83-25867 #
DE82-019434 ..... N83-26685 #
DE82-019437 ..... N83-26679 #
DE82-019465 ..... N83-26307 #
DE82-019527 ..... N83-26658 #
DE82-019566 ..... N83-26684 #
DE82-019569 ..... N83-26773 #
DE82-019804 ..... N83-26269 #
DE82-019811 ..... N83-25915 #
DE82-019877 ..... N83-26271 #
DE82-019991 ..... N83-26290 #
DE82-020069 ..... N83-26291 #
DE82-020070 ..... N83-26720 #
DE82-020107 ..... N83-26114 #
DE82-020127 ..... N83-25878 #
DE82-020189 ..... N83-26227 #
DE82-020250 ..... N83-26324 #
DE82-020260 ..... N83-25971 #
DE82-020509 ..... N83-26226 #
DE82-020820 ..... N83-26294 #
DE82-020911 ..... N83-26006 #
DE82-020969 ..... N83-26005 #
DE82-021015 ..... N83-26004 #
DE82-021134 ..... N83-26420 #
DE82-021376 ..... N83-26371 #
DE82-021706 ..... N83-26052 #
DE82-901910 ..... N83-26086 #
DE82-903812 ..... N83-26003 #
DE82-903861 ..... N83-26087 #
DE82-903864 ..... N83-26002 #
DE82-905303 ..... N83-26750 #
DE82-905784 ..... N83-26285 #
DE82-906427 ..... N83-25832 #
DE83-003425 ..... N83-25838 #
DE83-003632 ..... N83-25835 #
DE83-004003 ..... N83-26300 #
DE83-004371 ..... N83-25897 #
DE83-004386 ..... N83-26609 #
DE83-004400 ..... N83-26606 #
DE83-004476 ..... N83-26299 #
DE83-004525 ..... N83-26295 #
DE83-004946 ..... N83-26298 #
DE83-005068 ..... N83-26297 #
DE83-005175 ..... N83-26088 #
DE83-005241 ..... N83-26634 #
DE83-005262 ..... N83-26722 #
DE83-005340 ..... N83-26035 #
DE83-005431 ..... N83-26742 #
DE83-005605 ..... N83-26354 #
DE83-005666 ..... N83-26303 #
DE83-005808 ..... N83-26305 #
DE83-005810 ..... N83-25800 #
DE83-005855 ..... N83-26661 #
DE83-005967 ..... N83-26036 #
DE83-005968 ..... N83-26053 #
DE83-005982 ..... N83-26610 #
DE83-006039 ..... N83-25870 #
DE83-006040 ..... N83-25869 #
DE83-006184 ..... N83-26302 #
DE83-006238 ..... N83-25836 #
DE83-006260 ..... N83-25898 #
DE83-006283 ..... N83-26007 #
DE83-006401 ..... N83-26372 #
DE83-006414 ..... N83-26037 #
DE83-006416 ..... N83-26662 #
DE83-006424 ..... N83-26304 #
DE83-006425 ..... N83-26112 #
DE83-006440 ..... N83-26687 #
DE83-006450 ..... N83-26740 #
DE83-006474 ..... N83-26741 #
DE83-006511 ..... N83-26566 #
DE83-006526 ..... N83-26743 #
DE83-006567 ..... N83-25799 #
DE83-006593 ..... N83-26686 #
DE83-006609 ..... N83-26688 #
DE83-006611 ..... N83-26076 #
DE83-006665 ..... N83-26301 #
DE83-006686 ..... N83-26680 #
DE83-006766 ..... N83-25868 #
DE83-006809 ..... N83-25801 #
DE83-006841 ..... N83-26306 #
DE83-006924 ..... N83-26612 #
DE83-901132 ..... N83-26296 #

DFVLR-FB-81-37 ..... N83-26613 #
DFVLR-FB-82-05 ..... N83-26314 #
DFVLR-FB-82-16 ..... N83-26018 #
DFVLR-FB-82-17 ..... N83-25706 #
DFVLR-FB-82-29 ..... N83-26040 #
DFVLR-FB-83-02 ..... N83-25765 #

DFVLR-IB-222-82-A-11 ..... N83-25784 #

DFVLR-MITT-81-15 ..... N83-26054 #
DFVLR-MITT-82-06 ..... N83-26077 #
DFVLR-MITT-83-01 ..... N83-25841 #

DOC-81SDS4226 ..... N83-26148* #
DOC-81SDS4232-REV-A ..... N83-26141* #

DOE/CS-0127/3 ..... N83-26301 #
DOE/CS-20436/T1 ..... N83-26307 #
DOE/CS-54209/11 ..... N83-26761* #

DOE/DP-40136/1 ..... N83-26686 #

DOE/EIA-0149(77-81) ..... N83-26741 #
DOE/EIA-0333 ..... N83-26226 #

DOE/ER-0058-VOL-3A ..... N83-26323 #
DOE/ER-03077/174 ..... N83-26607 #
DOE/ER-03077/176 ..... N83-26609 #
DOE/ER-04679/T1 ..... N83-26721 #
DOE/ER-05002/31 ..... N83-25869 #
DOE/ER-10632/4 ..... N83-25836 #
DOE/ER-10657-1 ..... N83-25898 #
DOE/ER-10977/1 ..... N83-26743 #
DOE/ER-10978/1 ..... N83-26663 #
DOE/ER-12076/1 ..... N83-26722 #
DOE/ER-12077/T1 ..... N83-25870 #

DOE/ET-13389/T1 ..... N83-25802 #

DOE/ET-20279/170 ..... N83-26298 #
DOE/ET-20279/195 ..... N83-25914 #
DOE/ET-20279/204 ..... N83-26277 #
DOE/ET-27112/3 ..... N83-26303 #
DOE/ET-52027/4 ..... N83-26665 #
DOE/ET-52048/26 ..... N83-26687 #

DOE/EV-00790/T1 ..... N83-26420 #
DOE/EV-10019/2-VOL-2 ..... N83-26324 #
DOE/EV-10450/T2 ..... N83-26297 #

DOE/FE-00094/T1 ..... N83-26290 #

DOE/JPL-1012-84 ..... N83-26255* #

DOE/LC-10703/T1 ..... N83-26295 #

DOE/MC-14141/1304 ..... N83-25835 #

DOE/NASA/0032-81/11 ..... N83-26762* #
DOE/NASA/0051-3 ..... N83-26259* #
DOE/NASA/0235-2-VOL-1 ..... N83-26757* #
DOE/NASA/0235-2-VOL-2 ..... N83-26758* #
DOE/NASA/0235-2-VOL-3 ..... N83-26759* #
DOE/NASA/12726-19 ..... N83-26252* #
DOE/NASA/51040-45 ..... N83-26251* #
DOE/NASA/51044-31 ..... N83-25982* #
DOE/NASA/52040-44 ..... N83-26017* #

DOE/NBM-83006425 ..... N83-26112 #

DOE/NEM-3006809 ..... N83-25801 #

DOE/PC-30293/8 ..... N83-25837 #

DOE/SF-11567/1 ..... N83-26286 #

DOT-1-82-50 ..... N83-25919 #

DP-MS-81-80 ..... N83-25880 #
DP-MS-81-125 ..... N83-25879 #

DPD-610 ..... N83-25745* #
DPD-610 ..... N83-25768* #
DPD-610-VOL-3 ..... N83-25746* #

DR-4 ..... N83-25745* #
DR-4 ..... N83-25768* #
DR-4-VOL-3 ..... N83-25746* #

DRES-SM-1077 ..... N83-26033 #

DRIC-BR-84191 ..... N83-26067 #
DRIC-BR-86199 ..... N83-25677 #
DRIC-BR-86201 ..... N83-25825 #
DRIC-BR-86502 ..... N83-26648 #
DRIC-BR-86583 ..... N83-26104 #

DRL-003 ..... N83-25692* #
DRL-003 ..... N83-25693* #
DRL-003 ..... N83-25694* #

DRSMI/RL-82-3-TR ..... N83-26071 #

DRXTH-TE-CR-81120 ..... N83-26351 #

DTIC/TR-81/5 ..... N83-26736 #
DTIC/TR-83/1 ..... N83-26736 #

DTNSRDC-NLHP-CR-1-82 ..... N83-26737 #

DTNSRDC-83/002 ..... N83-26605 #

DTNSRDC/ASED-CR-03-82 ..... N83-25679 #

DTNSRDC/ASED-82/09 ..... N83-25675 #

DTNSRDC/CMLD-82/27 ..... N83-26532 #

D19-1982 ..... N83-26749 #

E-1253 ..... N83-25712* #
E-1334 ..... N83-26251* #
E-1348 ..... N83-26017* #
E-1362 ..... N83-25985* #
E-1506 ..... N83-25786* #
E-1526 ..... N83-25853* #
E-1539 ..... N83-25657* #
E-1546 ..... N83-26252* #
E-1558 ..... N83-25711* #
E-1570 ..... N83-26079* #
E-1591 ..... N83-25883* #
E-1606 ..... N83-26643* #
E-1618 ..... N83-25790* #
E-1629 ..... N83-25882* #
E-1657 ..... N83-26253* #
E-1675 ..... N83-25662* #
E-1682 ..... N83-25982* #

EDA-82-0060 ..... N83-25909 #

EG/G-82-B4569-VOL-2 ..... N83-26398 #

EL-2348-VOL-4 ..... N83-26003 #

EPA-AA-IMS-82-3 ..... N83-26765 #

EPA-340/1-82-006 ..... N83-26328 #
EPA-600.1-82-017 ..... N83-26451 #
EPA-600/2-82-100 ..... N83-26327 #
EPA-600/3-82-022 ..... N83-25850 #
EPA-600/3-82-092 ..... N83-26326 #
EPA-600/3-82-094 ..... N83-26331 #
EPA-600/3-82/096 ..... N83-26421 #
EPA-910/9-82-090 ..... N83-26329 #

EPA/AA/CTAB/TA/82-2 ..... N83-26766 #

EPRI-AP-2321-VOL-2 ..... N83-26087 #
EPRI-AP-2398-54 ..... N83-26285 #

EPRI-CS-2206 ..... N83-26086 #
EPRI-CS-2477 ..... N83-25832 #

EPRI-EA-2441 ..... N83-26750 #

EPRI-EL-2348-VOL-3 ..... N83-26002 #
EPRI-EL-2583-VOL-1 ..... N83-26004 #
EPRI-EL-2583-VOL-2 ..... N83-26005 #

EPRI-EM-2351-VOL-4 ..... N83-26300 #
EPRI-EM-2573-VOL-2 ..... N83-26296 #

ERC41012.67IP ..... N83-26702 #

ERP-780(1) ..... N83-26338 #
ERP-780(2) ..... N83-26339 #
ERP-783 ..... N83-26781 #
ERP-790 ..... N83-26341 #
ERP-791 ..... N83-26775 #
ERP-797 ..... N83-26342 #
ERP-802 ..... N83-26340 #
ERP-810 ..... N83-26367 #

ESA-CR(P)-1688 ..... N83-26231 #
ESA-CR(P)-1689 ..... N83-26232 #
ESA-CR(P)-1691 ..... N83-25776 #
ESA-CR(P)-1692 ..... N83-25777 #
ESA-CR(P)-1693 ..... N83-25758 #
ESA-CR(P)-1694-VOL-1 ..... N83-25759 #
ESA-CR(P)-1694-VOL-2 ..... N83-25760 #
ESA-CR(P)-1695 ..... N83-26091 #
ESA-CR(P)-1696 ..... N83-26313 #
ESA-CR(P)-1698 ..... N83-25784 #
ESA-CR(P)-1699 ..... N83-26008 #
ESA-CR(P)-1700 ..... N83-26038 #
ESA-CR(P)-1701-VOL-1 ..... N83-25761 #
ESA-CR(P)-1701-VOL-2 ..... N83-25762 #
ESA-CR(P)-1701-VOL-3 ..... N83-25763 #
ESA-CR(P)-1703 ..... N83-25739 #
ESA-CR(P)-1704-VOL-1 ..... N83-25972 #
ESA-CR(P)-1706-VOL-1 ..... N83-25764 #
ESA-CR(P)-1706-VOL-2 ..... N83-25974 #
ESA-CR(P)-1707 ..... N83-26373 #
ESA-CR(P)-1711-VOL-1 ..... N83-25975 #
ESA-CR(P)-1711-VOL-2 ..... N83-25976 #
ESA-CR(P)-1713 ..... N83-25785 #
ESA-CR(P)-1716 ..... N83-26233 #

ESA-CR-(P)-1704-VOL-2 ..... N83-25973 #

ESA-ESTL-49 ..... N83-26091 #

ESA-SP-193 ..... N83-26202 #

ESA-TT-753 ..... N83-26613 #
ESA-TT-754 ..... N83-26054 #
ESA-TT-763 ..... N83-26654 #
ESA-TT-764 ..... N83-25775 #
ESA-TT-765 ..... N83-26115 #
ESA-TT-766 ..... N83-26556 #
ESA-TT-775 ..... N83-26314 #
ESA-TT-777 ..... N83-26077 #
ESA-TT-779 ..... N83-26039 #
ESA-TT-780 ..... N83-26116 #
ESA-TT-784 ..... N83-25706 #
ESA-TT-792 ..... N83-26234 #
ESA-TT-793 ..... N83-26235 #
ESA-TT-813 ..... N83-26557 #

ESD-TR-82-095 ..... N83-26772 #
ESD-TR-82-258 ..... N83-26553 #
ESD-TR-82-403-VOL-1 ..... N83-26546 #
ESD-TR-82-403-VOL-2 ..... N83-26547 #
ESD-TR-82-418 ..... N83-26550 #
ESD-TR-82-419 ..... N83-26555 #

ETL-0284 ..... N83-26221 #
ETL-0299 ..... N83-26348 #
ETL-0304 ..... N83-25956 #

ETS-66 ..... N83-26772 #

EUR-7068-EN ..... N83-25844 #

E83-10255 ..... N83-26124* #
E83-10256 ..... N83-26125* #
E83-10257 ..... N83-26126* #
E83-10258 ..... N83-26127* #
E83-10259 ..... N83-26128* #
E83-10260 ..... N83-26129* #
E83-10261 ..... N83-26130* #
E83-10262 ..... N83-26131* #
E83-10263 ..... N83-26132* #
E83-10264 ..... N83-26133* #
E83-10265 ..... N83-26134* #
E83-10266 ..... N83-26135* #
E83-10267 ..... N83-26136* #
E83-10268 ..... N83-26137* #
E83-10269 ..... N83-26138* #
E83-10270 ..... N83-26139* #
E83-10271 ..... N83-26140* #
E83-10272 ..... N83-26141* #
E83-10275 ..... N83-26142* #
E83-10276 ..... N83-26143* #
E83-10277 ..... N83-26144* #
E83-10278 ..... N83-26145* #
E83-10279 ..... N83-26146* #
E83-10280 ..... N83-26147* #
E83-10281 ..... N83-26148* #
E83-10282 ..... N83-26149* #
E83-10283 ..... N83-26150* #
E83-10284 ..... N83-26151* #
E83-10323 ..... N83-26152* #
E83-10330 ..... N83-26153* #
E83-10331 ..... N83-26154* #
E83-10335 ..... N83-26155* #
E83-10336 ..... N83-26176* #

FAA-AM-82-15 ..... N83-26450 #
FAA-AM-82-16 ..... N83-26493 #

FAA-APO-81-9 ..... N83-25654 #
FAA-APO-83-1 ..... N83-25652 #

FAA-EE-82-19 ..... N83-26320 #
FAA-EE-82-20 ..... N83-26322 #

FAA-MS-82-5 ..... N83-25653 #

FAA-RD-82-69 ..... N83-25929 #

FHWA/NY/RR-82/98 ..... N83-25924 #

FHWA/RD-83/053 ..... N83-25918 #

FHWA/UT-81/1 ..... N83-25920 #

FOA-C-10210-M8 ..... N83-26638 #
FOA-C-10224-M8 ..... N83-26635 #
FOA-C-20484-T1 ..... N83-26744 #
FOA-C-30310-E1 ..... N83-26658 #
FOA-C-30314-E ..... N83-26009 #
FOA-C-54043-H1 ..... N83-26454 #

FSRP-RM-242 ..... N83-26363 #

FSU-STATISTICS-M615 ..... N83-26629 #
FSU-STATISTICS-M633 ..... N83-26630 #

FTD-ID(RS)T-0603-82 ..... N83-25961 #
FTD-ID(RS)T-0962-82 ..... N83-26069 #
FTD-ID(RS)T-1034-82 ..... N83-25738 #
FTD-ID(RS)T-1390-82 ..... N83-26707 #
FTD-ID(RS)T-1444-82 ..... N83-25996 #
FTD-ID(RS)T-1445-82 ..... N83-25955 #
FTD-ID(RS)T-1561-82 ..... N83-25715 #
FTD-ID(RS)T-1602-82 ..... N83-25954 #
FTD-ID(RS)T-1659-82 ..... N83-25796 #

FUB-12-1982 ..... N83-26356 #

FWS/OBS-80/22 ..... N83-26238 #

FZA-540-VOL-2 ..... N83-25676 #

GAO/AFMD-83-5 ..... N83-26732 #
GAO/AFMD-83-34 ..... N83-25687 #

GAO/FPCD-83-4 ..... N83-25731 #
GAO/GGD-83-4 ..... N83-25683 #
GAO/MASAD-83-9 ..... N83-25690 #
GAO/RCED-83-10 ..... N83-26246 #
GAO/RCED-83-111 ..... N83-25749 #
GAO/RCED-83-121 ..... N83-25750 #
GB-CONTRIB-437 ..... N83-26418 #
GC-TR-83-182 ..... N83-25787 #
GES-10068-VOL-6-APP-G-REV-A ..... N83-26146* #
GES-10075-VOL-6-APP-K-REV-B ..... N83-26145* #
GJBX-141-82 ..... N83-26227 #
GKSS-82/E/39 ..... N83-26312 #
GPO-17-041 ..... N83-26753 #
GPO-19-550 ..... N83-25736 #
GPO-19-995 ..... N83-26754 #
GRI-80/0128 ..... N83-25849* #
GRI-81/0107 ..... N83-25848 #
GRI-81/0116 ..... N83-25847 #
GRI-81/10029 ..... N83-25846 #
GSA/FCSC-82/001 ..... N83-26513 #
GTEC-31-3725(5) ..... N83-26763* #
H-REPT-98-65 ..... N83-26753 #
H-REPT-98-223 ..... N83-26755 #
H-1161 ..... N83-25665* #
HAC-FR-82-76-900 ..... N83-25792 #
HAC-REF-D4596-VOL-1 ..... N83-26126* #
HAC-REF-D4596-VOL-2-PT-A ..... N83-26127* #
HAC-REF-D4596-VOL-2-PT-B ..... N83-26128* #
HAC-REF-D4596-VOL-2-PT-C ..... N83-26129* #
HAC-REF-D4596-VOL-3-PT-A ..... N83-26130* #
HAC-REF-D4596-VOL-3-PT-B ..... N83-26131* #
HAC-REF-D4596-VOL-3-PT-C ..... N83-26132* #
HAC-REF-D4596-VOL-4-PT-A-BK-1 ..... N83-26133* #
HAC-REF-D4596-VOL-4-PT-A-BK-2 ..... N83-26134* #
HAC-REF-D4596-VOL-4-PT-B ..... N83-26135* #
HAC-REF-D4596-VOL-4-PT-C ..... N83-26136* #
HAC-REF-D4596-VOL-4-PT-D ..... N83-26137* #
HAC-REF-D4596-VOL-4-PT-E ..... N83-26138* #
HAC-REF-D4596-VOL-4-PT-F ..... N83-26139* #
HAC-REF-D4596-VOL-4-PT-G ..... N83-26140* #
HAC-REF-E1966 ..... N83-26150* #
HAC-REF-E8699 ..... N83-25792 #
HDL-PR-82-1 ..... N83-25952 #
HDL-TL-83-2 ..... N83-26032 #
HDL-TL-83-3 ..... N83-26031 #
HDL-TR-1979 ..... N83-26056 #
HDL-TR-2000 ..... N83-26710 #
HEPL-910 ..... N83-26059 #
HHI-82-261 ..... N83-26061 #
HS-236-0019-1679-VOL-1 ..... N83-26126* #
HS-236-0019-1679-VOL-2-PT-A ..... N83-26127* #
HS-236-0019-1679-VOL-2-PT-B ..... N83-26128* #
HS-236-0019-1679-VOL-2-PT-C ..... N83-26129* #
HS-236-0019-1679-VOL-3-PT-A ..... N83-26130* #
HS-236-0019-1679-VOL-3-PT-C ..... N83-26132* #
HS-236-0019-1679-VOL-4-PT-B ..... N83-26135* #
HS-236-0019-1679-VOL-4-PT-C ..... N83-26136* #
HS-236-0019-1679-VOL-4-PT-D ..... N83-26137* #
HS-236-0019-1679-VOL-4-PT-E ..... N83-26138* #
HS-236-0019-1679-VOL-4-PT-F ..... N83-26139* #
HS-236-0019-1679-VOL-4-PT-G ..... N83-26140* #
HS-236-0019-1679-VOL-4A-BK-1 ..... N83-26133* #
HS-236-0019-1679-VOL-4A-BK-2 ..... N83-26134* #
HS-236-1679-VOL-3-PT-B ..... N83-26131* #
HS-248-1490 ..... N83-26150* #
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IN-8 ..... N83-26045 #
INDU/DC/GMH/TR-83-53 ..... N83-26673 #
INFO-FT/82-03 ..... N83-25686 #
INPE-269-PRE/295 ..... N83-26525 #
INPE-2439-PRE/140 ..... N83-26771 #
INPE-2663-TDL/120 ..... N83-26571 #
INPE-2673-TDL/122 ..... N83-26573 #
INPE-2676-TDL/123 ..... N83-26526 #
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NSWC/TR-82-376 ..... N83-25965 #
NSWC/TR-82-394 ..... N83-25680 #
NSWC/TR-82-420 ..... N83-25828 #
NU-SML-TR-82-2 ..... N83-26102 #
NWC-TP-6406 ..... N83-25886 #
NYERDA-82-09 ..... N83-25842 #
NYSERDA-82-7 ..... N83-25921 #
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ONERA-NT-1981-3 ..... N83-26654 #
ONERA-NT-1981-4 ..... N83-26115 #
ONERA-NT-1981-5 ..... N83-26556 #
ONERA-NT-1982-2 ..... N83-26039 #
ONERA-NT-1982-3 ..... N83-26116 #
ONERA-NT-1982-5 ..... N83-26557 #
ONERA-RT-4/3269-SY-VOL-1 ..... N83-25761 #
ONERA-RT-5/3269-SY-VOL-2 ..... N83-25762 #
ONERA-RT-6/3269-SY-VOL-3 ..... N83-25763 #
ONR-TR-157 ..... N83-26629 #
ORC-82-12 ..... N83-25957 #
ORNL-5834 ..... N83-26276 #
ORNL/CSD-112 ..... N83-26610 #
ORNL/SUB-80-13817/1 ..... N83-26309 #
ORNL/SUB-9001-1 ..... N83-25921 #
ORNL/TM-8075 ..... N83-25866 #
ORNL/TM-8130 ..... N83-25877 #
ORNL/TM-8406 ..... N83-26088 #
ORNL/TM-8587 ..... N83-26035 #
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OSD/FSTC-82/121 ..... N83-26512 #
OSD/FSTC-82/160 ..... N83-26509 #
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OSD/FSTC-82/215 ..... N83-26515 #
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OWRT-A-063-NJ(1) ..... N83-26243 #
OWRT-A-094-NEV(A) ..... N83-26249 #
OWRT-B-068-MASS(1) ..... N83-26244 #
OWRT-B-073-ARIZ(2) ..... N83-26248 #
OWRT-C-10058-G(1479)(1) ..... N83-26245 #
OWRT-C-80152-S(8519)(1) ..... N83-25851 #
P-6847 ..... N83-26260 #
P-13120-C/P-16273-C ..... N83-26704 #
PAPER-1 ..... N83-26401 #
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PAPER-20 ..... N83-26417 #
PAPER-21 ..... N83-26418 #
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PB83-101659 ..... N83-25686 #
PB83-113860 ..... N83-26745 #
PB83-114579 ..... N83-25979 #
PB83-116616 ..... N83-26510 #
PB83-133637 ..... N83-26012 #
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PB83-135764 ..... N83-26562 #
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PB83-144501 ..... N83-26452 #
PB83-144543 ..... N83-25922 #
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PB83-144808 ..... N83-26360 #
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PB83-147488 ..... N83-26362 #
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PB83-147686 ..... N83-26748 #
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PB83-147991 ..... N83-26331 #
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PB83-149641 ..... N83-26513 #
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PB83-150136 ..... N83-26249 #
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PB83-150706 ..... N83-26514 #
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PMA-82-362 ..... N83-26548 #
PN-3660-1-42 ..... N83-26328 #
PNL-3870 ..... N83-26371 #
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PR-1 ..... N83-25892 #
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PS-RP-AI-002-VOL-1 ..... N83-25759 #
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PSRP-658 ..... N83-26343 #
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P83-10102 ..... N83-25744*
QR-2 ..... N83-25801 #
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QSTPR-1 ..... N83-26154* #

QTR-4 ..... N83-26706 #
QTR-11 ..... N83-25692* #
QTR-12 ..... N83-25693* #
QTR-13 ..... N83-25694* #

R-877 ..... N83-26709 #
R-883 ..... N83-26650 #
R-887 ..... N83-26505 #
R-893 ..... N83-26708 #
R-912 ..... N83-26698 #
R-922 ..... N83-26101 #
R-929 ..... N83-25989 #
R-932-PT-2 ..... N83-25942 #
R-938 ..... N83-26615 #
R-946 ..... N83-26564 #
R-950 ..... N83-26699 #
R-951 ..... N83-26701 #
R-957 ..... N83-26700 #
R-959 ..... N83-25953 #
R-967 ..... N83-26675 #
R-972 ..... N83-25939 #
R-976 ..... N83-25943 #

RADC-TM-82-7 ..... N83-25959 #

RADC-TR-82-88 ..... N83-26667 #
RADC-TR-82-253 ..... N83-25990 #
RADC-TR-82-256 ..... N83-25993 #
RADC-TR-82-286-VOL-4B ..... N83-25968 #
RADC-TR-82-286-VOL-4C ..... N83-25999 #
RADC-TR-82-288 ..... N83-26666 #
RADC-TR-82-295-VOL-1 ..... N83-25772 #
RADC-TR-82-307 ..... N83-25991 #
RADC-TR-82-319 ..... N83-26533 #

RAE-LIBRARY-TRANS-2087 ..... N83-25677 #
RAE-LIBRARY-TRANS-2089 ..... N83-25825 #

RAE-TM-FS(F)452 ..... N83-26529 #

RAE-TR-82067 ..... N83-25773 #

RAE-TRANS-2092 ..... N83-25812 #

RAND/N-1852-DNA ..... N83-25950 #
RAND/N-1882-AF ..... N83-25714 #

REPT-1-83 ..... N83-26651 #
REPT-21-4140(1) ..... N83-25794 #
REPT-37-155/NT ..... N83-26313 #
REPT-79-658-D2 ..... N83-26351 #
REPT-80-03-1-2409 ..... N83-25917 #
REPT-82-30 ..... N83-26614 #
REPT-82HV001 ..... N83-25747* #
REPT-83-1 ..... N83-26628 #
REPT-327 ..... N83-26373 #
REPT-328-VOL-2 ..... N83-25973 #
REPT-329-VOL-1 ..... N83-25972 #
REPT-5030-525 ..... N83-25849* #

RR-CE22 ..... N83-25910 #
RR-CE29 ..... N83-26041 #
RR-CE30 ..... N83-25923 #

RR-82-1-ONR ..... N83-26599 #
RR-98 ..... N83-25924 #

RSL-TR-360-13 ..... N83-26124* #

RSRE-MEMO-3472 ..... N83-26518
RSRE-MEMO-3512 ..... N83-26043
RSRE-MEMO-3527 ..... N83-25927
RSRE-MEMO-3530 ..... N83-25980
RSRE-MEMO-3532 ..... N83-26453
RSRE-MEMO-3540 ..... N83-26519

RSRE-82009 ..... N83-26520
RSRE-82010 ..... N83-26496
RSRE-82013 ..... N83-26497

S-REPT-98-108 ..... N83-26752 #

S-525 ..... N83-26448* #
S-3081 ..... N83-26717 #

SAI-83-134-WA ..... N83-25960 #

SAND-79-8037 ..... N83-26284 #
SAND-80-7173 ..... N83-26275 #
SAND-81-2218C ..... N83-26311 #
SAND-81-2454C ..... N83-25834 #
SAND-81-2598C ..... N83-25876 #
SAND-81-7009 ..... N83-26266 #
SAND-81-7045 ..... N83-26274 #
SAND-81-7065/9 ..... N83-26273 #
SAND-81-7065/15 ..... N83-26304 #
SAND-81-7066/8 ..... N83-26272 #
SAND-81-7091/1 ..... N83-26271 #
SAND-81-7099/8 ..... N83-26270 #
SAND-81-7179/1 ..... N83-26269 #
SAND-81-7184 ..... N83-26278 #
SAND-81-7187 ..... N83-26299 #
SAND-81-8022 ..... N83-26283 #
SAND-81-70667-VOL-7 ..... N83-26281 #
SAND-82-0092/3 ..... N83-26292 #
SAND-82-0092/4 ..... N83-26293 #
SAND-82-0198C ..... N83-25907 #
SAND-82-0634 ..... N83-25875 #
SAND-82-1283 ..... N83-25800 #
SAND-82-2327 ..... N83-26053 #
SAND-82-7022 ..... N83-26306 #
SAND-82-7101 ..... N83-26280 #
SAND-82-7104 ..... N83-26279 #
SAND-82-8006 ..... N83-26052 #
SAND-82-8214 ..... N83-26282 #
SAND-82-8217 ..... N83-26094 #
SAND-82-8257 ..... N83-26036 #
SAND-82-8663 ..... N83-26090 #
SAND-82-8667 ..... N83-25881 #
SAND-82-8911 ..... N83-25868 #
SAND-83-0040C ..... N83-26661 #
SAND-83-0056 ..... N83-26612 #

SAPR-5 ..... N83-26763* #

SATR-6 ..... N83-26713 #

SC5202.20SA ..... N83-26713 #
SC5266.2FR ..... N83-26714 #
SC5271.12FR ..... N83-26552 #
SC5325.1PR ..... N83-25892 #

SDL-83-2188-13TR ..... N83-25970 #

SDSSPP/DE/008/MI ..... N83-25739 #

SERI/TP-234-1681 ..... N83-26291 #

SERI/TR-214-1423 ..... N83-26085 #

SGD-458-PT-1 ..... N83-26777 #
SGD-458-PT-2 ..... N83-26778 #

SINTER-341094 ..... N83-25856 #

SIO-REF-82-4 ..... N83-26350 #

SIPL-82-15 ..... N83-26534 #

SM-6 ..... N83-25916 #

SPC-83-0010 ..... N83-25887 #
SPC-849 ..... N83-25887 #

SR-K1-04043 ..... N83-26124* #

SR-P1-04160 ..... N83-26125* #

SR-2 ..... N83-26334 #
SR-3 ..... N83-26026 #
SR-18 ..... N83-26350 #

SRI-02-6180 ..... N83-25913 #

SU-GL-3544 ..... N83-26695 #

SU-IPR-946 ..... N83-26776* #

SU-SLAC-248 ..... N83-26723 #

SU-STAN-CS-82-947 ..... N83-26739 #

SU-TR-65 ..... N83-26618 #

SVS-10123A-VOL-2 ..... N83-26142* #
SVS-10126-VOL-5-REV-A ..... N83-26143* #
SVS-10127-VOL-6 ..... N83-26144* #

SWR-6267/2 ..... N83-25826 #

SWRI-5739-1 ..... N83-25905 #
SWRI-6800-129 ..... N83-25904 #

T-119 ..... N83-25964 #

TACOM-TR-12591 ..... N83-26589 #
TACOM-TR-12595 ..... N83-26049 #
TACOM-TR-12643 ..... N83-26107 #
TACOM-TR-12663 ..... N83-26530 #

TAE-341 ..... N83-26096 #

TN-0144/82-VOL-1 ..... N83-25764 #
TN-0144/82-VOL-2 ..... N83-25974 #

TP-82-005-U ..... N83-26045 #

TR-A82-2 ..... N83-26561 #

TR-B-6 ..... N83-26602 #

TR-ONR-25 ..... N83-26626 #
TR-ONR-28 ..... N83-26625 #

TR-2 ..... N83-25861 #
TR-2 ..... N83-26748 #
TR-3 ..... N83-25889 #
TR-4 ..... N83-26621 #
TR-5 ..... N83-26001 #
TR-5 ..... N83-26712 #
TR-6 ..... N83-25694 #
TR-7 ..... N83-26711 #
TR-9 ..... N83-26264 #
TR-9 ..... N83-26591 #
TR-10 ..... N83-26266 #
TR-11 ..... N83-26097 #
TR-12 ..... N83-25818 #
TR-12 ..... N83-25891 #
TR-13 ..... N83-25831 #
TR-13 ..... N83-25859 #
TR-13 ..... N83-25888 #
TR-13 ..... N83-26105 #
TR-14 ..... N83-25819 #
TR-14 ..... N83-26106 #
TR-15 ..... N83-26715 #
TR-16 ..... N83-25890 #
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TR-31 ..... N83-25797 #
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TR-82-36 ..... N83-26601 #
TR-82-146-01 ..... N83-26329 #
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TR-173 ..... N83-26631 #
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TR-1078 ..... N83-26585 #
TR-1080-310-1 ..... N83-26565 #
TR-1982-1 ..... N83-26108 #
TR-8219 ..... N83-26597 #

TS/SE/JPB/10253/82 ..... N83-26008 #

TTU-IDR-65D ..... N83-26384 #

U-OF-IOWA-81-6 ..... N83-26107 #
U-OF-IOWA-81-11 ..... N83-26589 #

U-82-14B ..... N83-25821 #

UCID-10664 ..... N83-26662 #
UCID-19396 ..... N83-25804 #
UCID-19448 ..... N83-26114 #
UCID-19669-REV-6 ..... N83-26037 #
UCID-19670 ..... N83-26740 #

UCLA-12-1372 ..... N83-26317 #

UCRL-15461 ..... N83-25806 #
UCRL-15517 ..... N83-25799 #
UCRL-87230 ..... N83-26076 #
UCRL-87284 ..... N83-26679 #
UCRL-87370 ..... N83-25867 #
UCRL-87570 ..... N83-25805 #
UCRL-87723 ..... N83-25899 #
UCRL-87749 ..... N83-26685 #
UCRL-87779 ..... N83-26289 #
UCRL-87803 ..... N83-26074 #
UCRL-87824 ..... N83-25908 #
UCRL-87912 ..... N83-26606 #
UCRL-87941 ..... N83-26688 #

UDOT-MR-82-1 ..... N83-25920 #

UDR-TR-82-91 ..... N83-25896 #
UDR-TR-82-104 ..... N83-25713 #

UHMET-82-03 ..... N83-26372 #

UIEM-TR-81-9 ..... N83-26675 #

UILU-ENG-80-215 ..... N83-26650 #

UILU-ENG-80-2209 ..... N83-26709 #
UILU-ENG-80-2219 ..... N83-26505 #
UILU-ENG-80-2225 ..... N83-26708 #
UILU-ENG-81-2243 ..... N83-26696 #
UILU-ENG-81-2253 ..... N83-26101 #
UILU-ENG-81-2260 ..... N83-25989 #
UILU-ENG-81-2263-PT-2 ..... N83-25942 #
UILU-ENG-81-2555 ..... N83-26675 #
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UILU-ENG-82-2216 ..... N83-26699 #
UILU-ENG-82-2217 ..... N83-26701 #
UILU-ENG-82-2221 ..... N83-26568 #
UILU-ENG-82-2222 ..... N83-26587 #
UILU-ENG-82-2223 ..... N83-26700 #
UILU-ENG-82-2225 ..... N83-25953 #
UILU-ENG-82-2226 ..... N83-26582 #
UILU-ENG-82-2233 ..... N83-26675 #
UILU-ENG-82-2238 ..... N83-25933 #
UILU-ENG-82-2242 ..... N83-25943 #

UMTRI-82-42 ..... N83-26452 #

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US-PATENT-APPL-SN-282129 ..... N83-25789*
US-PATENT-APPL-SN-481106 ..... N83-25727* #
US-PATENT-APPL-SN-486470 ..... N83-26256* #
US-PATENT-APPL-SN-486471 ..... N83-25963* #
US-PATENT-APPL-SN-489675 ..... N83-25663* #
US-PATENT-APPL-SN-489902 ..... N83-26080* #
US-PATENT-APPL-SN-491125 ..... N83-25884* #
US-PATENT-APPL-SN-492522 ..... N83-25984* #
US-PATENT-APPL-SN-492963 ..... N83-25811* #
US-PATENT-APPL-SN-493865 ..... N83-25791* #
US-PATENT-APPL-SN-493866 ..... N83-26646* #

US-PATENT-CLASS-47-26 ..... N83-26078*
US-PATENT-CLASS-417-15 ..... N83-26078*
US-PATENT-CLASS-423-447.2 ..... N83-25789*
US-PATENT-CLASS-423-447.6 ..... N83-25789*
US-PATENT-CLASS-423-447.7 ..... N83-25789*

US-PATENT-4,381,174 ..... N83-26078*
US-PATENT-4,385,043 ..... N83-25789*

USAAEFA-80-07 ..... N83-25698 #
USAAEFA-80-17-2 ..... N83-25705 #

USAAVRADCOM-TR-82-D-28 ..... N83-26081 #
USAAVRADCOM-TR-82-D-36 ..... N83-25684 #

USAFETAC/TN-82/005 ..... N83-26368 #

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USCG-D-21-81-1 ..... N83-25689 #

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